AN ANNOTATED, DIPLOMATIC EDITION OF LEONARD DIGGES'S *A PROGNOSTICATION OF RIGHT GOOD EFFECT FRUITFULLY AUGMENTED ... OF 1555*

by

Jack B. Gorden, III

A Dissertation

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Doctor of Philosophy

Department of English

West Lafayette, Indiana

August 2020

THE PURDUE UNIVERSITY GRADUATE SCHOOL
STATEMENT OF COMMITTEE APPROVAL

Dr. Michael Johnston, Chair
Department of English

Dr. Shaun F. D. Hughes
Department of English

Dr. Dorsey Armstrong
Department of English

Dr. Richard Johnson-Sheehan
Department of English

Approved by:
Dr. MANUSHAG POWELL

Dedicated with love to the memory of

Mary Jo Gorden

My mother

Jack Tarpley

My father-in-law

For their love, support, and guidance—and for their constant, patient belief in me …

a belief they kept safe for me when I thought I'd lost it.

ACKNOWLEDGMENTS

It is both my obligation and very great pleasure to acknowledge the assistance and support of several people without whom this project could never have been completed. First, the members of my committee: Professor Shaun F. D. Hughes, who provided me with the inspiration and impetus to begin this project, and who patiently guided it through several early changes of direction; Professor Dorsey Armstrong, whose steady advice allowed me to arrive at "a done dissertation"; Professor Richard Johnson-Sheehan, who provided the indispensable eye of a rhetorician to a rhetoric project undertaken by a literary scholar; and especially my chairman, Professor Michael Johnston, who translated the Latin, and without whose encouragement, careful discernment, and guidance this project would still be sitting on my hard drive. Thank you all for your years of patient, learned, generous, and frankly fascinating mentorship. A debt of gratitude is also due my writing buddies, Professor Ashley M. Purpura and my dear friend Dr. J. Case Tompkins, whose coffee, advice, and companionship put me back on the path to completion.

I would also like to thank my family—my father, Jack Jr.; my mother-in-law, Sally; my wife, Laura; and my daughter, Addie—who have come with me on this journey, and whose love and support has sustained me. I love you all.

TABLE OF CONTENTS

Introduction

Who would use a science text as a teaching tool in an English class? Scientific texts are abstruse. They require a kind of engagement on the part of their readers that stymies relaxation. They are not "fun"—and are we not trying to instill in our students the axiom that "Reading is an Adventure"? Many students might say that the works of fiction in the academic canon are not much fun, either, but science texts don't even try! When I started my sophomore-level Russian Translation class as an undergraduate, I was exasperated to learn that we would be dealing primarily with science texts, at least to start out. I was an avid reader, and Chekhov in Russian sounded exciting. Expurgated papers about oxygen levels at a variety of altitudes sounded not only dull but hard.

Soon, though, I began to see the sense in my professor's syllabus. Science texts eliminate a great deal of the ambiguity that is the stock-in-trade of skilled poets and novelists. A good science writer seeks to be as clear and unambiguous as possible, exactly what first- and second-year language students need. The point of the translation class was to focus on grammar, and science was the perfect tool. So, go ahead. Embrace the tedium. It is educational, after all.

But let us not be too hasty. There is a genre of science text that moonlights in fun. Medieval and early-modern technical and scientific literature may not be *Le Morte Darthur*, but it is also not a typical school science textbook. These older works are quirky, full of a mysticism that seems, to our sensibilities, out of place in a text about science. Sometimes, despite the great names we all know (Bacon, Newton, Kepler), our twenty-first century perspective can lead us to some naïve assumptions that make wonderful object lessons for students of the humanities. These authors seem to modern readers to be dead wrong in sometimes amusing ways, and this view offers a springboard for teachers in a humanities classroom. We can be pulled into the texts by their exotic perspective, but when we read more closely the concepts these authors are struggling with, when we think about the resources they have to work with and the historical and cultural baggage they (like all scientists, even today) have to grapple with in order to arrive at their conclusions, we begin to appreciate that science is always contingent and, inevitably, exists in and serves cultural context. We gain an appreciation for the difficult intellectual work the writers of these texts are doing, and of the fact that we owe our current vantage to their ingenuity and insight. We begin to realize that this vantage of ours only seems lofty to us because we lack four hundred years of distance from it. Slowly an unexpected realization takes us by surprise: People are smart, and they always have been. This is the kind of insight reading in the humanities offers.

And that gets us to close reading. I propose to create a curriculum for university freshmen centered around creating editions, and the early-modern scientific text is an excellent way to begin. One thing reading does for us is move us out of ourselves and into the experiences of someone else. Editing does that doubly. When we edit a text, we have, as Wells and Taylor would have it, "taken the [author's] place."[1] But we are working in two directions. It is amusing to refer to editors as "the pimps of discourse,"[2] but that implies a kind of gatekeeping that, while perhaps inevitable, should certainly not be our goal. Perhaps better to think of ourselves as "the unacknowledged civil servants who promulgate and administer"[3] an author's work. An editor is an advocate for both author and reader.

---

[1] Stanley Wells and Gary Taylor, *William Shakespeare: A Textual Companion* (New York, NY: W.W. Norton, 1997), 7.
[2] ibid.
[3] ibid.

This two-pronged advocacy deepens the editor's experience with the text, pushing her or him to delve for a deeper insight than a casual reading would inspire. It also gives students an opportunity to create a useful tool and send it out to the community, strengthening their bond with a wider world that extends both forward and backward in time.

The text I have selected for this project is the earliest extant version of Leonard Digges's influential book, *A Prognostication of right good effect fruitfully augmented, containing plain, brief, pleasant, chosen rules, to judge the weather forever, by the Sun, Moon, Stars, Comets, Rainbow, Thunder, Clouds, with other Extraordinary tokens, not omitting the Aspects of Planets, with a brief judgement forever, of Plenty, Lack, Sickness, Death, Wars, etc. Opening also many natural causes, worthy to be known*.[4] One previous printed edition is said to have predated it, having been published in 1553, but this 1555 edition is the earliest to survive (no manuscript remains). Digges published during his lifetime one more edition, in 1556. All subsequent editions are heavily edited and augmented by his son, Thomas Digges. So, why did I select the 1555 edition as my copy-text?

Philip Gaskell takes us through his procedure for selecting a copy-text, considering all the possible witnesses available and selecting the one that best "represent[s] the text as the author wanted it to be read[.]"[5] Clearly, this criterion will eliminate from consideration any posthumously published edition redacted by Thomas. For his project, Gaskell settles on a copy-text that represents "that printed edition which is closest in line of descent to the author's

[4] Leonard Digges, *A Prognostication of right good effect fruitfully augmented, containing plain, brief, pleasant, chosen rules, to judge the weather forever, by the Sun, Moon, Stars, Comets, Rainbow, Thunder, Clouds, with other Extraordinary tokens, not omitting the Aspects of Planets, with a brief judgement forever, of Plenty, Lack, Sickness, Death, Wars, etc. Opening also many natural causes, worthy to be known.* (London: Thomas Gemini, 1555), Ai r. https://search-proquest-com.ezproxy.lib.purdue.edu/docview/2240950422/Sec0002. STC 435.35.
[5] Philip Gaskell, *A New Introduction to Bibliography* (New Castle: Oak Knoll Press, 2009), 339.

manuscript."[6] We will do likewise, but our reasons are different from his, because our priorities are slightly different. While we also are concerned with accidentals, substantives, and teasing out authorial intent, we have a more pressing pedagogical goal.

Using the earliest extant witness as our copy-text means that we cannot collate previous printings; the 1555 edition as it stands is the closest we can come to the author's holograph copy. Furthermore, unlike Gaskell, we do not intend to consult the subsequent edition. This solves two of the practical problems created by producing an edition with a class of undergraduates. First, it eliminates the need for journeyman editors to engage in the complex and time-consuming work of comparing witnesses. They can get on to the task at hand, that being a very close reading of the copy-text as it exists in front of them. The second reason is the most practical of all: that is, the 1555 edition is freely available to students on Google Books. The 1556 printing is not. Being able to use Google Books enables students to access the copy-text easily wherever they have access to an internet connection. The instructor can project it onto a screen. Students can magnify the pages, move easily through the document and, perhaps best of all, they do not have to be careful with it. The situation is ideal for the undergraduate classroom.

That doesn't mean there are no problems. At sixty-five printed pages, this text is longer than one might want for an undergraduate English class. Fortunately, the *Prognostication* is broken up into sections of widely varying lengths, and because this is a scientific text, there is no narrative throughline to suffer if the sections are disarticulated. This means that the creative instructor can divide the text up in any of a number of ways, using some sections for short, in-class exercises and using others for longer homework assignments or group activities. One could

[6] ibid., 340.

even divide the document up among a large class and have the students produce, among them, a single complete edition by the end of a semester.

The text

This book was republished several times over the course of Digges's lifetime and that of his highly celebrated son, Thomas, who acted as a sort of literary executor after his father's death. Thanks in large part to Thomas's faithful edits and augmentation over the years, the *Prognostication* was able to remain relevant, popular, and highly influential for decades, increasing not only Thomas's own fame as a mathematician, but that of his father, too.

The *Prognostication* was a foundational work that helped to establish the epistemology of the modern era by prioritizing empiricism, clarity, and praxis. Under the capable stewardship of the younger Digges, it played a pivotal role in introducing England to the heliocentric model of Nicolaus Copernicus. It went far beyond this, though. As we shall see later, the younger Digges also used his father's *Prognostication* as a venue to establish that the universe is infinite and filled with stars and worlds innumerable. And the *Prognostication* does all this in language understandable to an audience with moderate education and little skill in Latin.

But is this truly the mission of the *Prognostication*, to create a book "easy of all willing ingenious to be perceived," as Digges states in his "Note to the Reader" (p. 5)? In the introduction to his *Tectonicon*, Digges laments that technical knowledge is too often "locked vp in straunge toungues,"[7] and he purposes to publish something suitable for "the Landemeater*, Carpenter, or Mason."[8] He goes on to say that "For theyr sakes I am here prouoked not to hide,

[7] Leonard Digges, *A boke named Tectonicon briefely shewynge the exacte measurynge, and speady reckenynge all maner lande, squared tymber, stone, steaples, pyllers, globes. [et]c.* (London: Thomas Gemini, 1556; Ann Arbor: Text Creation Partnership,
2011), https://quod.lib.umich.edu/e/eebo/A20450.0001.001/1:2?rgn=div1;view=fulltext, STC 6849.5.
[8] ibid.

but to open, and so encrease the talent which I haue receyued." This seems a pretty clear statement of his intention. The *Tectonicon* was published in 1556, the year after the *Prognostication*, and the two do have similar statements in their introductions. Surely we can take an author at his word on so simple a matter.

This democratizing impulse, though, is complicated by certain details of the presentation. Most conspicuously, modern readers will be quick to notice the presence of Latin throughout. It is certainly far from the primary language of the *Prognostication*, but it is hard to ignore, especially in the earlier pages. Latin begins its intrusion immediately after the introduction, in a curious prefatory essay Digges titles, "Against the reprovers of Astronomy, and sciences Mathematical" (pp. 6–7 of this edition). It is impossible to read it without noticing the envenomed tone.

The first Latin passage in the book is a quote in the second sentence of the essay, "Scientia non habet inimicum nisi ignorantem" (Science does not have an enemy unless he/she is ignorant). Just to the right of this passage is the book's first marginal notation, "Vituperant, qui simpliciter eas ignorant" (They who simply don't understand them censure them). Perhaps the less learned are not off to a very good start with Digges's book. One could be forgiven for concluding that he is mocking them behind their backs.

In this prefatory essay, Digges takes an opportunity to defend the science of astronomy from those who disparage it. Its tone is scathing; he seeks to discredit the ideas of those who accuse astronomers of practicing unholy arts, and he does this by citing numerous scholars, all of whom have written in Latin. Digges is using these scholars as a cudgel. He seeks to discredit the detractors of his profession by citing sources of such weight that his enemies will be forced to accept his defense, or failing that, that readers whose opinions are at issue will be convinced that these charges have been roundly answered. The use of Latin is, here, inevitable if he wishes to mount a scholarly argument. Latin is the language of scholarship, and because he wishes to argue with scholars, he must do so with Latin. But let us not be too hasty in excusing his use of Latin in this prefatory essay as isolated and unavoidable. He has some more turns of phrase that need to be examined if he is to escape charges of elitism.

Just seven lines down from the top of the essay, shortly after his imprecation in Latin against the ignorant, Digges writes, "I refer all of that sort, which have tasted any learning (the rest not regarded) to the first part of famous *Guido Bonatti …*" There is no way for us to soften it, this is dismissive of the unlearned—and in plain English! A closer examination, however, reveals that Digges takes care to soften the blow. Near the bottom of page 6, speaking of the concepts he is preparing to bestow on the reader in the main body of his book, he writes, "for thy encouragement in these, thus I say and truly, the ingenious learned, and well experienced circumspect student *mathematical* receiveth daily in his witty practices, more pleasant joy of mind, than all thy goods (how rich so ever thou be) can at any time purchase." While the term "student mathematical" does not unambiguously include the uneducated reader, it could be construed to do so. This passage could be read as the author extending his hand to anyone who accepts his defense of the mathematical arts, inviting them to join the ranks of the friends of "that learned *Guido*, that excellent *Guido Bonatti …*" Later on near the middle of page 7 he asks us, his "loving Reader," how it is that this "noble science … is counted vain, and of so small strength. The secret truths and most pleasant profits therein not desired, yea, utterly despised, and of some busy biting bodies rejected as very lies." He answers his own question: "Let no man doubt ignorance, the great enemy of all pure learning hath wrought this." But by now, we're part of his team. We have rejected the "nice divines," and we have come over to the side of the learned. *We* are not the ignorant ones, *they* are.

Now that we have joined the ranks of the learned, we should examine a bit more closely his case "Against the reprovers of Astronomy, and sciences Mathematical." Digges maintains that defending the mathematical arts is unnecessary, but he is, nevertheless, at pains to call to account those who "of late have in writing dispraised these goodly arts [astronomy]," calling their objections "foolish rashness, and rash foolishness." He then sends them to Guido Bonatti to be schooled, referring them to his *De utilitate Astronomiae in communi*, which amounts to the first tractate of his *Liber Astronomiae*. In this work, Guido has a similar project to Digges, so it is perhaps natural that Digges should quote him.[9] Digges then agrees with Melancthon's assessment that it is fruitless to even speak to such people; rather, "Sinamus … una cum Epicuro ineptire" (Let's … play the fool with an Epicurean). He calls their criticism "manifestum insaniæ genus" (a manifest type of insanity) and declares of the task of arguing with them "Quod magis opus habent Medicis, quam Geometris" (This is a job more for a doctor than a geometer). What prompted this outburst?

Cohen tells us that "England was something of a technological backwater until the mid-sixteenth century," first due to its isolation, and then because of the Dissolution of the Monasteries in the 1530s.[10] But this phenomenon seems to have been going on for a while. Roger Bacon, in 1267, "lamented that mathematics was regularly counted among the seven 'Black Arts.'"[11] And while things had started to improve by the time Digges was writing this

[9] Giudo Bonatti, *Liber Astronomiae: Part 1*, ed. Robert Hand, trans. Robert Zoller (Berkely Springs, WV: Golden Hind Press, 1994), 1.
[10] Adam Max Cohen, *Shakespeare and Technology: Dramatizing Early Modern Technological Revolutions* (NY, NY: Palgrave Macmillan, 2006), 22-23.
[11] ibid., 24.

essay for inclusion in his *Prognostication*, the social stigma didn't completely go away in his lifetime. Even in the seventeenth century, "some parents [at Oxford] opted not to send their children there because they were concerned" that the new mathematical faculty chairs might exert a corrupting influence.[12]

Apparently, Digges was not the only astronomer to feel the need to defend himself from accusations of necromancy. John Dee, as might be imagined, had similar problems.[13] The frustration must have been hard to stomach, and the desire to lash out irresistible. Even the outspoken Menancthon does not escape persecution. Digges also references Melancthon's letter to Simon Grynaeus. This letter served as a prologue to the 1531 edition of Johannes de Sacrobosco's *De sphaera* until, ironically, it was removed by censors.

One of the epithets Digges uses stands out: "Epicurean Theologians." It seems hard to square with what we know about Epicureans, with their notion that the gods do not involve themselves in human affairs. But Melancthon used that same term to describe the detractors of the mathematical arts. In a clever reversal, considering the religious dogmatism that seemed to drive his detractors, Melancthon concludes that anyone who would deny the efficacy of judicial astrology is an atheist because, he says, such a person denies the providence of the Almighty.[14] It is this argument of Melancthon that Digges cites when he speaks of "how far wide they allege the scriptures against the *Astronomer*, which make wholly with the *Astronomer*." In other words, the detractors say that the scriptures teach against astronomy when scripture, in fact, wholly supports it. Digges is content to leave it at Melancthon, however, and not dig, himself, into the scriptural supports to his art.

---

[12] ibid.
[13] ibid., 23-24.
[14] Sachiko Kusukawa, *The Transformation of Natural Philosophy: The Case of Philip Melanchthon* (Cambridge: Cambridge University Press, 2011), 129.

Rather than get into the scriptural weeds, Digges's next stratagem, at the bottom of page 6, is to issue a challenge to the nay-sayers. He directly addresses these "enemies of all good doctrine" in the second person, challenging them to "give an overthrow, and that with your pen." If Guido or Melancthon's arguments do not silence his opponents, then Diggs himself, with the present volume, will "take some pain in publishing the wonderful unknown pleasant profits of these dispraised high knowledges, and by that means to enforce silence." This might seem a strong ending for such a volley, but another tactic of Digges in this essay bears examination.

As part of his enumeration of the joys of studying mathematics, discussed above, Digges goes on to discuss the art in more ecstatic terms, and for this, he quotes yet another mathematician, Joachimus Fortius Ringelbergius, from 1529 in Antwerp.[15] Digges quotes, "Id tantum quod pulchrum est, quod purum est quod divinum est, nihil mortale sapiens dulci ardore amplectitur" (With sweet passion the wise man embraces that thing which is beautiful, which is pure, which is divine, and which is in no way mortal). This passage is almost touching in its apparent earnestness. Having just quoted Aristotle to say that "scientia est notitia vera conclusionum, quibus propter demonstrationem firmiter assentimur" (science is a true concept of conclusions, by which, on account of a demonstration we might firmly assent), an eloquent enough precis of an early-modern scientist's faith in his art, Digges is moved to passion, quoting such words as *pulchrum*, *purum*, and *divinum*. To finish up with *nihil mortale* leaves little room for doubt about why Digges believes humanity studies the heavens.

The passion, both opprobrium and ardor, of the prefatory essay does not carry on into the rest of the book, however. Turning to the body of the *Prognostication*, we find that Digges

[15] Joachimus Fortius Ringelbergius, *The Celebrated Treatise of J.F. Ringelbergius. De Ratione Studii*, trans. George Butler Earp (London: Simpkin and Marshall, 1830), xix, 127. Ringelbergius was a Belgian mathematician and engraver who wrote widely on mathematics, mysticism, and astrology. (Kirsti Andersen, *The Geometry of an Art: the History of the Mathematical Theory of Perspective from Alberti to Monge* (New York: Springer, 2008), 166.)

adopts a more staid tone with his reader, and while the Latin does not disappear by any means, it does become less frequent and less intrusive. A fair bit of the Latin is to be found in the marginalia. These marginalia take a few forms. The first we encounter on page 8 is, effectively, a restatement of the heading. It reads, "De observandis meteoris" (On observing meteors). All this does is introduce the adjacent paragraph, which is headed, "How to Judge Weather by the Sun Rising, or Going Down." But this is the only Latin example of this form of marginal note. Most of these marginal "headings" are in English, including several particularly redundant examples. This one from page 11, "Common tokens of weather, meet for all manner wits," is in the left margin adjacent to the heading "Now ensueth extraordinary tokens for the knowledge of weather." There are not many of this type of note. Even in English there are only six.

A type of note closely akin to these is the note that flags information covered in the adjacent paragraph that might not be readily obvious from the heading of the section. These notes serve a similar function to tabs. They are waypoints, too, but they serve a more practical function than those previously mentioned that simply rephrase a heading. On page 12, under the heading "Now ensueth extraordinary tokens for the knowledge of weather," Digges includes a paragraph wherein he describes the phenomena that accompany the rising of Canis Minor. In the margin, he has included the note "Canis minoris efficatia" (Rising of the little dog). Again, the number of these in English (107) is vastly greater than the number in Latin (23). Curiously, of these twenty-three, thirteen are of a type that otherwise exists mostly in English, and for which the language is of only minor importance. These notes summarize the contents of a paragraph, but these notes use astronomical symbols to communicate their contents in a sort of shorthand version of what is described in the main text. An example in English follows from page 15:

♄ ☌ □, & ☍, with ♂ The conjunction, quadrature*, or opposition, of *Saturn*, with *Mars*, in watery signs,

declare in summer, rain, often showers, with hail, thunder and lightning.

This marginal note, as can be seen, is an index of what is contained in the main text. It does not summarize or restate the text, which goes on to enumerate the meaning of the signs. The note only serves as a way for the reader to index the information. An example of the Latin variety appears on page 27 as follows:

♃ ☌, ✶ △ □ vel ☍ cum ☽

The conjunction, sextile, trine, quadrature*, or opposition of *Jupiter* with the *Moon*, showeth a fortunate day, chiefly to obtain suits of Kings, noble Princes, Prelates &c, of Lawyers, and Religious persons: and a meet time to study, to journey, to take an honest mater in hand.

This is the first in a series of such notes in Latin, and it follows on after a long series of other types of notes almost exclusively in the same language. The language here, though, is almost completely immaterial to understanding; anyone with even a cursory knowledge of Latin can easily make the translation. Those with no Latin at all can quickly glean the meaning from context and comparison with the previous such notes in English. It almost seems like the language of these notes might have been incidental, a force of habit from having set the preceding fourteen-odd notes in Latin, except that there are some few intervening notes in English.

Another form of marginal note in the *Prognostication* is the restatement. These notes differ from the previous type in that they offer a summary of the contents of the adjacent paragraph rather than a simple index of the topic at hand. The first example of this type of note appears at the bottom of page 8.

Luna rubens ventat, pallor pluit, Alba serenat

If the *Moon* in the third of her change*, yea three days before the full, or in the midst of the quarter, be found of pure light: no thing compassing her, the end

> direct up, she promiseth fair weather, but bent to red color, provoketh wind. The *Moon* pale, or somewhat inclined to black, obscure or thick, threateneth rain.

The English translation of the marginal note used in the text of this edition is "If the moon is red [wind] blows; if it's pale, it rains; if it's white, it will be calm." This is a fairly literal, if not very detailed, summation of the contents of the body text. There are nine such notes in the *Prognostication*, and they appear only in Latin. Why include such a note? Surely a Latin-literate reader could just as easily read the English and gain a more complete understanding of the material, and the inability to understand this note will deprive the less-educated reader of no important information. The answer, at least in some instances, is that this is a citation. In searching for this same phrase, I found it appearing several times, but other than Digges the earliest instance I found was from Guglielmo Gratarolo's *Gulielmi Grataroli Bergomatis Artium & medicine doctoris opuscula. Quorum Cathalogum versa Pagella Indicat*,[16] published in Lyon in 1558, three years after Leonard Digges published the *Prognostication*. While it is possible that Gratarolo was quoting Leonard Digges three years later in Lyon, I find it more likely that they, and those who followed them in the use of this phrase, were all citing an earlier author whom I was unable to find.

There are four marginal notes in the text that offer additional information not available in the main body of the text, two in English and two in Latin. One of the Latin notes appears on page 10, adjacent to a section titled "Of Thunders: What they Signify." The note reads "Signum futurorum bellorum" (A sign of future wars). Nowhere in the accompanying text is there mention

[16] Guglielmo Gratarolo, *Gulielmi Grataroli Bergomatis Artium & Medicine Doctoris Opuscula.* (Lyon: Gabriel Coteri, 1558), 208. Guglielmo Gratarolo (1516–1568) was a popular and prolific Italian writer on the subjects of medicine, philosophy, and alchemy. He converted to Protestantism later in life and fled to Basil, in Switzerland. ("Guglielmo Gratarolo, The Castle of Memory (1562)," Cambridge Core (Cambridge University Press, August 2016), https://www.cambridge.org/core/books/memory-arts-in-renaissance-england/guglielmo-gratarolo-the-castle-of-memory-1562/DB398CA352F382DE167948C6F3DE196F.)

of wars of any kind. Many terrors are foretold, such as “slaughter of a great man,” “horrible murders,” and even “other bloodshed,” but no specific mention of war. The other Latin instance is on page 25.

Universalis est Eclipsis Lunæ Non semper in novilunio, sed in capite, et cauda

The *Sun* being in the contrary point to the full *Moon*, enforceth the shadow of the earth, then directly put between the *Sun* and the *Moon*, towards the *Moon*, hiding more or less of the *Moon*, as she differeth from the Ecliptical.

The Latin, again using the translation included in this edition, says “The eclipse of the moon is common, not always in the new moon, but in the *caput* and *cauda*.” *Caput* and *cauda* refer to the “head” and “tail,” the highest and lowest points (respectively) of the moon in relation to the ecliptic.[17] In neither of these examples is the information in the marginal note to be found in the main text. Both Latin phrases might be fairly simple for an English speaker with a modest background in Latin to work out, but that cannot be relied upon.

There are two examples in the marginal notes of references, where Digges refers readers to another work. These appear on pages 10 and 23, and both are in Latin. The former refers the reader to book 4, fol. 83 of Cardano’s *De subtilitate*, the latter to Pliny’s *Natural History, Book 2*. In both cases, Digges is simply sending the curious reader to another source for additional information.

Thus far these notes, for the most part, seem to fulfill the criteria set out by William Slights when he writes about marginalia’s, “concrete materiality, repetitive verbal formulas, and other techniques designed to render recalled events immediately present …”[18] He sees marginal notes as boiling ideas down, concentrating them, mapping them out, and making them more

[17] “Caput,” ΛΟΓΕΙΟΝ (University of Chicago), accessed June 26, 2020, https://logeion.uchicago.edu/caput.

[18] William W. E. Slights, “Back to the Future -- Littorally: Annotating the Historical Page,” in *The Future of the Page*, ed. Peter Stoicheff and Andrew Taylor (Toronto: University of Toronto Press, 2004), pp. 71-89, 79.

consumable. “Complicated periodic sentence structures from the text,” he explains, “are reduced in the margins to catalogues of topoi, lists of dates, and abbreviated comments. Such headings – or sidings – also serve as visual reference points. This indexing function is specifically part of the iconology of the page.”[19] We see these marginalia performing these functions. Digges uses his long indexing lists of phenomena, not even expressed in words, oftentimes, but in astronomical symbols glued together with prepositions. These visual reference points, mostly in English, serve to guide the reader. There are a few instances where the non–Latin speaking student might miss something. For the most part, though, the notes do their job.

One more type of marginal note needs to be addressed, however, that doesn’t serve this function as well. There are two notes wherein Digges might be seen to be using Latin to “talk over the heads” of his less-educated readers. The first instance is on page 25, and it reads, “Hæc incredibilia videntur tantum hiis, qui mathematicis demonstrationibus non assueue runt, &c.” (These things seem incredible only to those not accustomed to mathematical proofs, &c.). The second, on page 33, says, “Hæc diligentissime observare oportet solertem Medicum, nisi majora pericula cogant” (It is fitting for a skillfull doctor to observe these things diligently, and if not then worse dangers will come). While the latter almost qualifies as additional information, it only serves, really, to intensify the importance of the information already given. Therefore, while it will go over the heads of a less-educated reader, the omission is fairly inoffensive. In the former case, however, one can’t help wondering why Digges included it. All it seems to do is establish an in-group and an out-group among his readers, not only in the note’s content, but also in its language.

[19] ibid.

The instances of Latin in the body of the work, seven in number, should not be ignored. Mary Thomas Crane claims, in her book *Losing Touch with Nature: Literature and the New Science in Sixteenth-Century England*, that "Digges provides Latin citations only when making claims about the supernatural significance of natural events."[20] Perhaps, but the dichotomy between "natural" and "supernatural" is a slippery concept. For example, on page 25, Digges cites the famous statement from Pseudo-Dionysius the Areopagite from the moment of Christ's death. At this moment a darkness falls across the Earth that Pseudo-Dionysius can see in Egypt. Digges quotes him as saying, "Aut Deus naturæ patitur, aut mundi machina dissoluitur" (Either the God of nature suffered, or creation was destroyed). We can say without much fear of contradiction that these dark portents would have indeed been "natural events" with a "supernatural significance." However, another example of a Latin citation in the body of the text is on page 35. Here, Digges discusses the dangers of cutting hair during a waning moon. He writes, "*Cutting, shaving, clipping*, in the wane, causeth baldness: what is then cut, groweth little." He supports this statement with a citation from Cardano, "Calvitium prohibet oleum tartari" (The oil of tartar prevents baldness). Do the vagaries of hair growth constitute a supernatural significance? From our twenty-first century perspective, perhaps the linking of nearly any earthly phenomenon to the waning of the moon would seem supernatural. But whether an English person of Digges's day would have seen it this way is a much more open question.

Interestingly, in an essay published a year before, titled "Marlowe and the New Science," Crane had already begun examining the reasons for the use of Latin in these texts and come to the conclusion that reticence, possibly even obfuscation, is at least part of the reason for its use.

---

[20] Mary Thomas Crane, *Losing Touch with Nature: Literature and the New Science in Sixteenth-Century England* (Baltimore, MD: Johns Hopkins Univ. Press, 2014), 28.

On page 24 of the *Prognostication*, Digges discusses earthquakes that follow quiet times. He explains that when winds retreat below the earth they eventually cause earthquakes, but that while they are in the process of gathering there the weather becomes still because of their absence. Digges supports this with the Latin phrase, "Signum est futurorum bellorum" (A sign of future wars). (This is, incidentally, almost identical to the marginal note on thunder at the bottom of page 10, "Signum futurorum bellorum.") While Crane, in her book, names "Signum est futurorum bellorum" as an illustration of her claim that the Latin indicates a desire to mitigate a claim of supernatural significance,[21] in her essay from a year prior she states the case a little more directly.

> In sixteenth-century England, … Protestant belief that God's miraculous interventions in nature had ceased meant that writers increasingly cast doubt on the supernatural interpretation of "meteors."… Leonard Digges, writing in his Prognostication Everlasting (1556), repeats the belief that earthquakes foretell wars but casts some doubt by citing this belief in Latin …[22]

This is not the whole of Crane's understanding of Latin in early modern science texts, but if softening the impact of potentially dangerous, or at least distasteful, ideas is a reason for using Latin in science texts, what would their ubiquity in these texts mean about the attitudes toward stellar portents? Belief in judicial astrology was not universal, of course. Even Chaucer, over a century and a half before, said of the casting of horoscopes that they are, "observances of judicial

[21] ibid.

[22] Mary Thomas Crane, "Marlowe and the New Science," in *Christopher Marlowe in Context*, ed. Emily Carroll Bartels and Emma Smith (Cambridge, MA: Cambridge University Press, 2013), pp. 252-261, 255. Crane cites Digges's 1556 edition of the *Prognostication*, but the section she cites is identical to the corresponding section of our 1555 edition, with the only difference being that Digges changes 1555's "Plenty of winds, entered into holes …" on page 24, to 1556's "Plenty of winds, sucked into holes…."

matere and rytes of payens, in which my spirit hath no faith...."[23] In spite of this statement, Chaucer's actual attitude toward judicial astrology is hotly debated.[24] However, whether we believe Chaucer's denial or not, the fact remains that he wrote those words for a reason, and this fact leads us to the inescapable conclusion that at the end of the fourteenth century, skepticism of astrology was working its way into the culture of England. We have no reason to believe that, on the threshold of the Copernican revolution, those doubts would have entirely gone away.

While Crane has shown us that Digges's use of Latin wasn't unusual in his day, there is something else about the *Prognostication* that makes it stand out and might make it somewhat less attractive to those without advanced degrees. The market for almanacs had been growing steadily throughout the first half of the sixteenth century. Starting around 1540, a market had emerged for a disposable almanac, one that fulfilled a popular desire "for a small, easily portable book to assist with daily tasks."[25] These almanacs offered their users a handy resource for keeping track of their daily lives. They had generous margins for recording notes and they provided at a glance information that people wanted. They gave specific "dates of eclipses, the dates of important feasts, the golden number"*[26] and numerous other handy references. One boasted "a paragraph at the bottom of each page giving for every year the length of time between Christmas and Shrovetide."[27] One almanac went so far as to provide price predictions for various commodities.[28] The almanac was finding its way into the purses of the common people. Erler places Leonard Digges firmly into a different category. His *Prognostication* is a book that

[23] Geoffrey Chaucer, *A Treatise on the Astrolabe*, ed. Sigmund Eisner, vol. 6 (Norman, OK: University of Oklahoma Press, 2002), ll. 518 - 519.
[24] For an excellent discussion of the scholarly conversation around Chaucer's belief in astrology, see ibid., 37–40, and n. ll. 517–19.
[25] Mary C. Erler, "The Laity," in *A Companion to the Early Printed Book in Britain, 1476-1558*, ed. Vincent Gillespie and Susan Powell (Cambridge: D.S. Brewer, 2014), pp. 134-149, 139.
[26] ibid., 138.
[27] ibid.
[28] ibid.

teaches the reader how almanacs work. It doesn't tell us what days this year will be best for cutting the cow's hair; it tells us how to figure it out for ourselves. She credits Digges with creating "the fullest paradigm for later manuals" with his "scientific book."[29] He was not, however, aiming his book at the ordinary person who needs to buy barley flour.

Leonard Digges's life

Leonard Digges was born into an ancient Kentish family[30] sometime around 1515. The family name, alternately spelled "Digg," "Diggs," and "Digges," resided at this time at Barham, at the manor of Brome. Leonard's father, James, left Brome to Leonard in 1535,[31] but in 1547 Leonard sold it and removed to Wooton, also in Kent, which he would eventually leave to his own son, Thomas.[32] James Digges sent Leonard to Oxford, though the speculation that Leonard may have been a member of University College is, apparently, unfounded.[33] We do know that he began studying at Lincoln's Inn in 1537. We also know he had an interest in military matters because he wrote about them, as we shall see, and he was involved in militia activity in defense of the eastern coast of Kent in 1545,[34] around the time of his fateful association, in 1554, with Wyatt's Rebellion,[35] an attempt to stop the marriage of Mary I to Philip I of Spain. His decision to involve himself in this uprising would haunt him for the rest of his short life.

---

29 ibid.. 139.
30 D. M. Loades, *Two Tudor Conspiracies* (London: Cambridge University Press, 1965), 81.
31 Edward Hasted. "Parishes: Barham," in *The History and Topographical Survey of the County of Kent: Volume 9*, (Canterbury: W Bristow, 1800), 350-358. *British History Online*, accessed June 18, 2020, http://www.british-history.ac.uk/survey-kent/vol9/pp350-358.
32 Edward Hasted. "Parishes: Wootton," in *The History and Topographical Survey of the County of Kent: Volume 9*, (Canterbury: W Bristow, 1800), 364-373. *British History Online*, accessed June 18, 2020, http://www.british-history.ac.uk/survey-kent/vol9/pp364-373.
33 Alfred Brotherston Emden, *A Biographical Register of the University of Oxford, A.D. 1501 to 1540* (Oxford: Clarendon Press, 1974), 169.
34 E. G. R. Taylor, *The Mathematical Practitioners of Tudor & Stuart England (Published for the Institute of Navigation.)* (New York, NY: Cambridge University Press, 1954), 166.
35 Loades, *Two Tudor Conspiracies*, 81.

For his part in the rebellion, Digges was sentenced to death, but, most likely thanks to the intervention of his kinsman, Lord Clinton[36] (to whom he dedicates the *Prognostication* you now hold in your hands), he was reprieved and received a pardon later that year, though his property continued to be held. He paid a recognizance of £49 17s 8d for return of his movable goods, and another of 400 marks (£266 13s 4d) to redeem his lands, which he apparently discharged the year before his death at approximately the age of forty-four years.[37]

It would be easy to imagine, in light of these events, that Digges spent what should have been the best years of his life trying to recover from the consequences of these earlier adventures, throwing himself into his scholarship, mostly in mathematics, optics, and astronomy, in an attempt to recover his reputation and his fortune.[38] Perhaps he did, but he seems to have been energetic and engaging in his pursuit of knowledge even before the rebellion. Our first mention of Leonard Digges is in 1542, in the context of his stay at Guisnes, in Calais, which was at the time England's last continental holding. Sir John Wallop, the captain of Guisnes, had written to Thomas Cheney, Warden of the Cinque Ports, to tell of the marvelous show of wit and learning to which Digges and his companions had treated their host, and asking the Warden to give them leave to travel abroad. We do not have Cheney's reply, "but it was certainly the case that at a later date Leonard Digges showed himself familiar with a wealth of Continental writings on the subject which he had made his own,"[39] so perhaps someone might have given him permission to travel.

[36] Colin A Ronan "The Origins of the Reflecting Telescope" *Journal of the British Astronomical Association* 101, no. 6 (1991): 337.
[37] Loades, *Two Tudor Conspiracies*, 120.
[38] Taylor, *The Mathematical Practitioners of Tudor & Stuart England*, 166.
[39] ibid., 22.

It is likely, though, that some of the writings he cites might have come, not from his travels, but from the library of his friend, Dr. John Dee.[40] It is easy to imagine how Dee's collection must have fascinated Digges. Dee's library, called the *Bibliotheca Mortlacensis* after Dee's home at Mortlake, which contained works by such great names as Witelo,[41] Pecham,[42] and Grosseteste,[43] still retains its mythic power, even if only in memory. To this day it is widely regarded as

> one of the great monuments of English Renaissance culture. By the time it was catalogued in 1583, Dee had assembled England's largest and—for many subjects, at least—most valuable collection of books and manuscripts. Its dispersal, which began even while he lived, was perhaps the most significant redistribution of textual resources since the dissolution of the monasteries.[44]

---

[40] John Dee remains a controversial figure in early-modern English science to this day. He is held, variously, as "a 'progressive' Renaissance scientist, whose work contributed to the fitful beginnings of the scientific revolution in England," as well as a dabbler in spiritualism and the occult whose interest detracted from any contribution he may have made to the progress of science. (Stephen Clucas, *John Dee: Interdisciplinary Studies in English Renaissance Thought* (Dordrecht: Springer, 2006), 1-2.)

[41] Witelo was "a natural philosopher and perspectivist of the second half of the thirteenth century." He is best known for his work on optics, known as the *Perspectiva*. (Sabetai Unguru, "Witelo and Thirteenth-Century Mathematics: An Assessment of His Contributions," *Isis* 63, no. 4 (1972): pp. 496-508, https://doi.org/10.1086/350999, 496.)

[42] Colin A Ronan, "Leonard and Thomas Digges," *Endeavour* 16, no. 2 (1992): 91. Johm Pecham, along with Witelo and Bacon, was a natural philosopher of the thirteenth century who published on optics, his own work being titled *Perspectiva communis*.

[43] Francis Rarick Johnson, *Astronomical Thought in Renaissance England* (New York, NY: Octagon, 1968), 79-80. Robert Grosseteste (ca. 1168–1253) Bishop of Lincoln. Grosseteste is credited by some with pioneering the Scientific Method. (Neil Lewis, "Robert Grosseteste", *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2019/entries/grosseteste/>.)

[44] William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst, MA: University of Massachusetts Press, 1995), 30

Perhaps most importantly, Dee's library held more books by Roger Bacon[45] than those by any other author,[46] and Bacon's *Opus Majus* was indispensable to Digges's work on optics, [47] which we shall further discuss below.

But Digges was indebted to Dr. Dee for more than the use of his library. Digges's relationship to Dee was sufficiently close that, when Digges was implicated in Wyatt's Rebellion, he appointed his friend, should Digges die early, to carry on his own work in bringing up his son, Thomas, in the mathematical arts. This was a wise contingency on Digges's part, as, despite his ultimate pardon, he would die when Thomas was only thirteen years of age.

But before he died, he was a very busy man. Leonard Digges has been credited with the invention of two instruments for which the world is in his debt. One of these is the theodolite, a surveying instrument used to measure horizontal — and today usually vertical — angles. Confusingly for modern readers, the instrument Digges describes as a *theodelitus* in his *Pantometria*, published by his son Thomas after the elder Digges's death, only measures the horizontal[48] and was in use before Digges, having been illustrated in 1512 in a book by Waldseemüller.[49] But this is not the instrument that represents Digges's contribution to the field of land surveying. Immediately thereafter he describes another instrument, which he terms an *instrument topographicall*. This is a device "of such perfection, that no manner altitude, latitude, longitude, or profundity can offer itself, howsoever it be situate, which you may not both readily

---

[45] Roger Bacon (1220?–1292) was a thirteenth-century Franciscan Friar with an interest in "experimental-scientific concerns." He devised a new system of study for the universities and the "model of an experimental science." He seems to have been condemned by the Franciscans, possibly because of his study of astrology and alchemy. (Jeremiah Hackett, " Roger Bacon", *The Stanford Encyclopedia of Philosophy* (Summer 2020 Edition), Edward N. Zalta (ed.), URL = < https://plato.stanford.edu/archives/sum2020/entries/roger-bacon/>.)
[46] Johnson, *Astronomical Thought in Renaissance England*, 79-80.
[47] Ronan, "Leonard and Thomas Digges," 91.
[48] Leonard Digges and Thomas Digges, *A Geometrical Practice Named Pantometria...* (London: Henrie Bynneman, 1571), Hiv r-v. https://search-proquest-com.ezproxy.lib.purdue.edu/docview/2240950422/Sec0002, STC 6858 .
[49] E. G. R. Taylor, "A Regional Map of the Early XVIth Century," *The Geographical Journal* 71, no. 5 (1928): 474-479. https://doi.org/10.2307/1783281, 479.

and most exactly measure."[50] Though primitive, this "instrument topographicall" is a theodolite in the modern sense, that measures both the horizontal and vertical, and his is its first description.

In addition to the theodolite, Digges may also be the first to have built a working telescope. There is much controversy over who might have constructed the first working "perspective glass," as the instrument was sometimes called before the word "telescope" appeared in the seventeenth century. Thomas, in publishing Leonard's *Pantometria*, states,

> my father … hath by proportional Glasses duly situate in convenient angles, not only discovered things far off, read letters, numbered pieces of money with the very coin and superscription thereof, cast by some of his friends of purpose upon Downes in open fields, but also seven miles off declared what hath been done at that instant in private places …[51]

Colin A. Ronan argues that this passage is evidence that Leonard Digges had managed to construct a working telescope before his death in 1559, decades before Dutch optician Hans Lippershey presented his in 1608. Ronan triangulates this data point with statements from John Dee and from some of the other works of Thomas Digges to construct a compelling argument for Leonard Digges as the builder of the first telescope.[52] While we may never get a definitive answer to whether he was the first, the evidence at least proves conclusively that Leonard was involved with the technology at a very early stage.

While his contributions to practical instrumentation have been long-lasting, he is perhaps best remembered for his writing. Leonard Digges claimed, in all of his works, to "bring within the reach of the artisan and the master-craftsman a knowledge of the mathematical arts which

---

[50] Digges and Digges, *A Geometrical Practice Named Pantometria*, Ki v.

[51] ibid., Aiii v.

[52] For more information, see Ronan, "Leonard and Thomas Digges," 91-94, and idem, "The Origins of the Reflecting Telescope" *Journal of the British Astronomical Association* 101, no. 6 (1991): 335-342.

had hitherto been 'locked up in strange tongues'."[53] But the shadow of his rebellion still pursued him. After his attainder, Digges found it difficult to locate English printers who would work with him.[54] While this must have been galling initially, it ultimately drove him into the shop of Thomas Gemini of Blackfriars, a Flemish printer and engraver who had established himself in London several years earlier.[55] Gemini was not primarily a printer, he was a mathematical instrument maker of rare skill; two of his intricately engraved astrolabes are still on display today at the Royal Belgian Observatory and England's National Maritime Museum.[56] Such finely wrought instruments must have impressed Digges, and the two struck up a relationship that resulted in Gemini printing the second and third *Prognostication* and the *Tectonicon*, as well as "making and supplying the instruments the author recommended."[57] Gemini does not seem to have been a very active printer. A search of the British Library's English Short Title Catalogue, which is an extensive electronic listing of English and American books published between 1473 and 1800, has few listings for Thomas Gemini.[58] Five are printing jobs for Leonard Digges: two editions of the *Prognostication*, 1553 (STC 435.35) and 1555 (STC 435.39), and one of the *Tectonicon*, 1556 (STC 6849.5). With the exception of his first, 1553 edition of the Prognostication, these Gemini printings were the only books we know of that Digges would publish during his lifetime. Gemini's other two Digges jobs are later editions of the *Tectonicon* published after Digges's death (STC 6849.8 and 6850). The remaining ESTC entries do not represent printing jobs at all, but engravings—one, a map of the British Isles Gemini did for a George Lily in 1555, another, an anatomy book printed by George Herford in 1559.

---

[53] Taylor, *The Mathematical Practitioners of Tudor & Stuart England*, 23.
[54] ibid., 166-67.
[55] ibid., 20.
[56] ibid., 166
[57] ibid.
[58] In order to see all entries, it is necessary to search under both Thomas Gemini and Thomas Geminus.

Interestingly, the entry for the *Tectonicon* designated STC 6850 boasts two entries in the Stationers Register. The first (Entry SRO359) records the purchase by one Lucas Haryson of "his lycense for pryntinge of Dygges pronostication and his Tyctonycon."[59] The next (Entry SRO440) bears two notes of particular interest. The first: "Recevyd of Thomas marshe for his lycense for pryntinge of Dygges pronostication and his tectonicon which he boughte of lucas haryson." The second note reads, "This is the first instance in the Registers of the purchase by one printer of another of what we should now call the 'copyright' of a book."[60]

The *Prognostication* is the text edited here, and his *Tectonicon*, published the next year, deals with mensuration, the measuring of things, especially the surveying of land. Digges also wrote two books that were not published during his lifetime, but were, rather, edited and published by his son, Thomas. These were *Pantometria* and *Stratioticos*. *Pantometria* is a follow-on to *Tectonicon*, in which he introduces his *instrument topographicall*, as mentioned above. *Stratioticos* is a book on military mathematics, for which Thomas takes a bit more credit, describing it on the title page as, "Long since attempted by Leonard Digges Gentleman, Augmented, digested, and lately finished, by Thomas Digges, his Son."[61] While Thomas Digges has brought us two of his father's works that we might otherwise not have because of Leonard's untimely death, his continued work on the *Prognostication* has been particularly illuminating, as we shall see.

---

[59] "L haryson," Stationers' Register Online, accessed July 5, 2020, https://stationersregister.online/entry/SRO359.
[60] "T marshe," Stationers' Register Online, accessed July 5, 2020, https://stationersregister.online/entry/SRO440.
[61] Leonard Digges and Thomas Digges, *An Arithmeticall Militare Treatise, Named Stratioticos…* (London: Henrie Bynneman, 1579), Ai r. https://search-proquest-com.ezproxy.lib.purdue.edu/docview/2248531401/pageLevelImage/4C5D6A61D6A24959PQ/1?accountid=13360&imgSeq=1, STC 6848.

Note on Thomas Digges

Research on Leonard Digges is complicated by the ubiquity of his more famous son, Thomas, who not only published two of his father's scientific works after the elder Digges's death, but was also himself a prolific writer of scientific texts. Confusingly for researchers, Thomas had a son, also named Leonard, a well-regarded translator and poet who was a contemporary of William Shakespeare and one of the Bard's early enthusiasts. Since Leonard the Younger's oeuvre does not interact directly with that of his grandfather, this section will focus on Thomas, who was his father's student until the age of 13, when Leonard died, and Leonard's effective literary executor after the latter's death.

As mentioned previously, Leonard Digges died early, sometime around 1559, when his son Thomas was only thirteen years old. As the two men had agreed, Thomas came under the care of Dr. John Dee after his father's death. The relationship was very fruitful. Dee referred to Thomas as "my most worthy mathematical heir," and, for his part, Thomas called Dr. Dee his "revered second mathematical father."[62] The two frequently collaborated, and they seem to have complemented one another's styles of scholarship, with Dee famously fascinated by magic and metaphysical pursuits (although Sherman makes the case that his reputation as a "magus" is overblown and essentializing[63]) while Thomas took more of an interest in experimentation and practical application. Certainly, Dee's young protégé would have availed himself of Dee's renowned library.

---

[62] Stephen Johnston, "Like Father, like Son? John Dee, Thomas Digges and the Identity of the Mathematician," in *John Dee: Interdisciplinary Studies in English Renaissance Thought*, ed. Stephen Clucas (Dordrecht, NL: Springer, 2006), 65.

[63] William H. Sherman, *John Dee: The Politics of Reading and Writing in the English Renaissance* (Amherst, MA: University of Massachusetts Press, 1995), 12-19.

Roughly four years after his father's death, on Saturday, March 13, 1563, Leonard and Thomas Digges were "restored in blood by an act of parliament."[64] It is possible that the protestant Elizabeth I's recent ascension to the throne might have facilitated this. This, restoration, along with his association with Dee, must have had the effect of alleviating any lingering troubles he might have had in getting his father's work published.

His first publication, in 1571, was his father's *Pantometria*, which Thomas had completed and to which he had appended his own *A Mathematicall Discourse of Geometricall Solids*, which Stephen Johnston calls "the most self-consciously advanced and novel work on geometry published in sixteenth-century England."[65]

In 1572, a new star appeared in the heavens to much interest. It was a supernova, of course, and Thomas wrote his *Alae seu scalae mathematicae* of 1573, his only Latin work, in part to publish his observations.[66] The new "star" was in Cassiopeia, and like all supernovae, did not long remain visible to earthly observers. But the great Tycho Brahe,[67] in comparing Digges's observations with his own, concluded that the former "did not make adequate allowance for the effect of parallax* in using his instrument." With current technology we can see that, in fact, Digges's observations were much more accurate even than Tycho's.[68] Digges's *Alae seu scalae*

---

[64] Simonds d'Ewes. "Journal of the House of Commons: March 1563," in *The Journals of All the Parliaments During the Reign of Queen Elizabeth*, (Shannon, Ire: Irish University Press, 1682), 86-90. *British History Online*, accessed June 19, 2020, http://www.british-history.ac.uk/no-series/jrnl-parliament-eliz1/pp86-90.
[65] Stephen Johnston, "Digges, Thomas (c. 1546–1595), mathematician and member of parliament," in *Oxford Dictionary of National Biography*, ed. Lawrence Goldman, September 23, 2004, https://www.oxforddnb.com/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-7639.
[66] S. K. Heninger, "Tudor Literature of the Physical Sciences," *Huntington Library Quarterly* 32, no. 2 (February 1969): 101-133, 125, https://doi.org/10.2307/3816682.
[67] Tycho Brahe (1546 –1601) a Danish astronomer, astrologer, and alchemist, has been called "the greatest giant of observational astronomy since Hipparchus." Burtt has also called him "the first competent mind in modern astronomy to feel ardently the passion for exact empirical facts." (Edwin A. Burtt, *The Metaphysical Foundations of Modern Physical Science* (London: Routledge, 1924), 49 - 50.) This last may be an overstatement, in light of what we know of Thomas Digges. Nevertheless, Tycho's is a name to conjure with in heliocentric astronomy.
[68] David H. Clark and F. Richard Stephenson, "The New Star of Tycho Brahe," in *The Historical Supernovae. The Study of Supernova Remnants Based on Historical Observations* (Oxford: Pergamon Press, 1976), pp. 172-190, 185.

mathematicae served as the companion volume to Dee's *Parallaticae commentationis praxeosque nucleus quidam* of the same year.[69]

In 1576 he published a new edition of his father's *Prognostication* with the addition of his own *A Perfit Description of the Caelestiall Orbes according to the most aunciente doctrine of the Pythagoreans, latelye reuiued by Copernicus and by Geometricall Demonstrations approued*, which was "the first exposition in English of the Copernican System of the world."[70] Perhaps more impressive, this work by Thomas Digges was also the first to declare "an infinite universe no longer bounded by the eighth, ninth or tenth sphere."[71] This represents a departure from previous editions of the *Prognostication*, which propounded the Ptolemaic, geocentric model of the cosmos. This model, as will be evident from reading the *Prognostication*, differed from the model we are familiar with today.

In the Ptolemaic system the universe consists of a series of nested spheres made of a perfect substance called aether. There is no space between the spheres, and a body or a number of bodies is embedded in each sphere. It can be helpful to envision these nested spheres as the layers of an onion, with a speck of some object embedded in most.

These spheres can be divided into two sets, the sublunary and aetheric spheres; the sublunary was anything that existed below the moon, while the aetheric included the moon and everything above it. The sublunary spheres start with the inner-most sphere, that of Earth. Above the sphere of earth is the sphere of Water, which would float above the sphere of Earth if God did not raise the land up above the water in places. Above water is air, and above air is Fire. It should be noted that sublunary substances seek to join their sphere of origin. This is why stones

[69] Heninger, "Tudor Literature of the Physical Sciences," 125.
[70] E. G. R. Taylor, *The Mathematical Practitioners of Tudor & Stuart England*, 323.
[71] ibid.

and water seek to fall and air and fire seek to rise. The sublunary realm is where we live out our lives.

The aetheric spheres begin with the sphere of the Moon. Above that is the sphere of Mercury, then above that the sphere of Venus, then the Sun, Mars, Jupiter, and Saturn. Saturn is the most distant planet anyone knew about before the discovery of Uranus in the eighteenth century, but it is not the last sphere. There are three more. Outside of the sphere of Saturn is the sphere of the Fixed Stars. All those objects traditionally called stars are suspended, more-or-less stationary, in a spinning sphere, moving about the earthly center but fixed in relation to each other. Outside the sphere of the Fixed Stars is the Primum Mobile, the prime mover, that sets all the other spheres in motion and keeps them that way. Outside of that, we have the Empyrion, the dwelling place of God, the Angels, and all the Elect. This is a very basic picture of Ptolemaic astronomy that will serve to introduce you to that model of reality.[72] Thomas Digges, taking Copernicus as his starting point, is about to strike a blow to this harmonious notion of how the universe works.

Thomas's model even outstrips Copernicus himself in scope. While Copernicus accounted for the absence of detectable parallax* by proclaiming that the sphere of the fixed stars possessed "a diameter vastly greater than that assigned to it by previous astronomers," he otherwise retained the model of the stars put forth in Ptolemy, with the stars fixed on the surface of that sphere. On the question of the infinity of the universe, Copernicus remains agnostic.

---

[72] For an excellent introduction to the Ptolemaic system of the cosmos, see Chapter 2 of James Evans's, *The History and Practice of Ancient Astronomy* (New York, NY: Oxford University Press, 1998), 75-128.

Digges, on the other hand, commits himself to an infinite universe, with numberless stars spread throughout endless space.[73]

It is difficult to overstate the impact of Thomas's publication of this conclusion in his home country and in his native language. Johnson and Larkey, in their seminal work, "Thomas Digges, the Copernican System, and the Idea of the Infinity of the Universe in 1576" declare his *Description of the Caelestiall Orbes* to be "the principal English treatise on the Copernican system to be printed before the second quarter of the seventeenth century," and they point out that Thomas Digges's contemporaries considered him the "foremost English mathematician of the first thirty years of Elizabeth's reign, with the possible exception of John Dee,"[74] which stands as a bold statement of Thomas Digges's notability.

William Gilbert is generally credited with being "the first English scientist *of note* to give his support to the Copernican system."[75] But not only was he clearly not more notable than Digges, it was not until his *De Mundo nostro Sublunari Philosophia Nova* was posthumously published in 1651 that Gilbert finally embraced the orbiting of the Earth about the Sun. Even if we accept the date of 1600, when, in his *De Magnete* he accepted the notion of the Earth's rotation on its axis, Digges still predates Gilbert by twenty-four years.[76]

The scientist most often credited with first publicly proclaiming "in England the new Copernican theory of the universe and also the first to add, as a corollary to the new system, the idea that the universe was infinite in extent"[77] is Giordano Bruno.[78] But Bruno did not come to

---

[73] Francis R. Johnson, Sanford V. Larkey, and Thomas Digges, "Thomas Digges, the Copernican System, and the Idea of the Infinity of the Universe in 1576," *The Huntington Library Bulletin*, no. 5 (April 1934): pp. 69-117, https://doi.org/10.2307/3818095, 72.
[74] ibid., 71.
[75] ibid., 69. Emphasis mine.
[76] ibid., 70.
[77] ibid., 69.
[78] Despite Digges's having preceded him in this, Giordano Bruno deservedly remains a giant in the field of early-modern astronomy. As "one of the most adventurous thinkers of the Renaissance" (Dilwyn Knox, "Giordano

England until 1583, seven years after Digges published his *Description of the Caelestiall Orbes*, which should disqualify him immediately. Add to this the fact that he did not understand English, published exclusively in Latin and Italian, and was virtually unknown in England during his brief, two-year stay,[79] and the notion that he proclaimed his discovery in England is rendered a technicality, at best.

But for all the significance of Digges's writing in his *Description of the Caelestiall Orbes*, perhaps the feature of that work that made the greatest impact was the diagram he placed at the beginning.

Bruno", *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2019/entries/bruno/>.), he roundly disproved many of the concepts outlined above in my summation of the Ptolemaic cosmos, such as the desire of the sublunary elements to return to their spheres and the structure of the aetheric realms from incorruptible aether. (ibid.)

[79] ibid., 69-70.

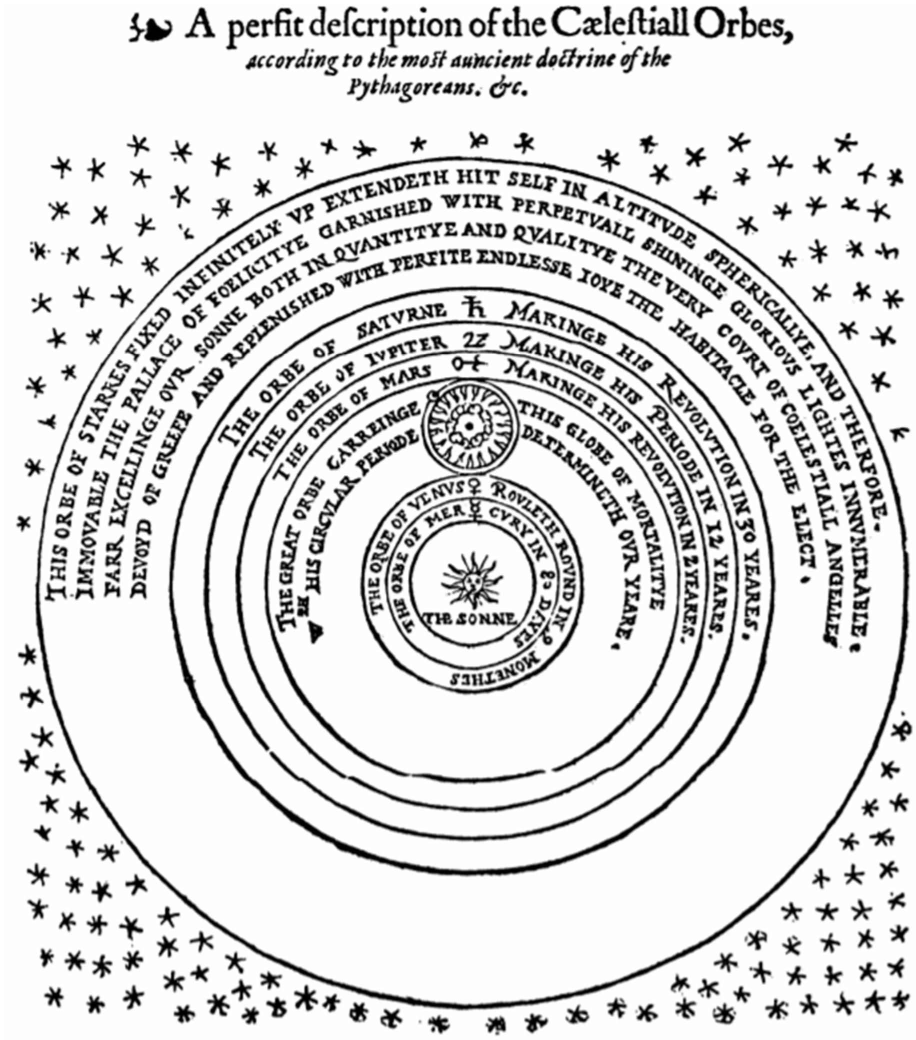


Figure 1 (Thomas Digges, Francis R. Johnson and Sanford V. Larkey, "Thomas Digges, the Copernican System, and the Idea of the Infinity of the Universe in 1576," The Huntington Library Bulletin, no. 5 (April 1934): pp. 69-117, https://doi.org/10.2307/3818095, 78)

As you can see from Figure 1, the fixed stars are not entombed in the ether of a crystalline sphere. Rather, beyond the eighth sphere an infinity of stars scatters at various distances from a central sun. While Digges's published defense of infinite stars in connection with Copernicanism was certainly unique in England at the time, until the middle of the seventeenth century "[n]o astronomer outside England … appears to have published a plan of the universe which contains the essential feature of Digges' diagram" either.[80]

With all this discussion of infinity, it bears pointing out that there wasn't anything particularly surprising in the sixteenth century about an infinite universe. The idea had been part of metaphysical speculation for at least a century. Digges's contribution was the idea that Copernicus's system could provide "physical proof of ideas that had hitherto been purely metaphysical speculations."[81] Digges was bringing his brilliant, empirical methodology, based on experimentation and painstaking collection of data, to a problem, thereby taking it from the world of philosophical musing to the realm of praxis. Nothing Thomas could have done—even his repeated and faithful reissuing of his father's *Prognostication*, keeping it ever abreast of the latest advances in knowledge—could better have carried on his father's work. Leonard Digges had devoted his all-too-short, twice-interrupted career (once suspended by punishment and then cut short by an untimely death) to elucidating mathematics and science in practical terms. Even though he died when Thomas was still quite young, the father's work had clearly made a great impression on the son. For, despite his beloved master's devotion to the metaphysical and theoretical, Thomas maintained his father's devotion to the practical.

Johnson and Larkey have speculated, based on the excellence of his *Alae seu scalae mathematicae* and his own statements about his planned future projects, that had he not been "forced to lay aside his astronomical studies," he may have "anticipated by a quarter of a century the discoveries made by Kepler and Galileo."[82] As it is, his 1579 text on military mathematics,

[80] ibid., 97.
[81] ibid., 105.
[82] ibid., 97.

known as *Stratioticos*, was his last major composition. His career thereafter was increasingly devoted to social and political duties.

Conventions used in this edition

This edition has two chief objectives. We have already covered the primary pedagogical objective at some length, above. The other objective is to provide the reader with a clear, comprehensible text that nevertheless provides an aesthetically immersive approximation of what Digges's ideal audience might have experienced in encountering the *Prognostication*. With that in mind, we would do well to specify what we mean by the terms "ideal audience" and "aesthetically immersive experience."

To begin with the former, Digges seeks to convey to his audience a readable text full of practical information. Modern readers, however, will have difficulty with some of the idiosyncratic spellings, odd letter forms, and unfamiliar vocabulary, not to mention his name-dropping of famous writers who are no longer familiar to us. Obviously, few modern readers can fairly be said to be his ideal audience.

But Digges's text has some other issues for modern readers that may have stymied some of his contemporaries, too. In spite of his sometimes-stated goal of making his writing accessible, he seems unable to resist the urge to present at least some text that remains "locked up in strange tongues,"[83] as he himself said. There is a fair bit of Latin sprinkled into the *Prognostication*, and, while some of it simply repeats things already said elsewhere in English, it still forms a barrier to comprehension for many readers, both now and in the sixteenth century.

With this in mind, it seems Digges's ideal audience is someone curious about matters of astronomy and mathematics, someone with enough Latin to be able to understand short passages,

[83] Digges, *A boke named Tectonicon.* A1. v.

but who can appreciate having things spelled out in English. This reader should be able to understand the English text as written and follow along with the sixteenth-century cultural assumptions. While none of us will ever experience the *Prognostication* through the eyes of a London reader of the sixteenth century, this edition will do what it can. To that end, it employs several conventions designed to at least counteract somewhat the effect of four intervening centuries, while still providing an aesthetically immersive experience. By this, I mean the text should be pleasurable to read because it is beautiful and gives a reader the agreeable impression of intuitung, however fleetingly, the reading experience of a fairly educated English commoner of the sixteenth century.

The following is a list of the conventions used in making this edition. Priority has been given to making the product as readable as possible while preserving the layout of the original. Wherever it was deemed necessary, endnotes, keyed to the text with lowercase Roman numerals, provide **historical details and important names**. **Unfamiliar terms** are flagged with an asterisk and explained in a glossary, and a list of **conjectural emendations** provides notes where the text is in some way defective. These emendations are set off in the text with [brackets]. **Textual notes** are set off with a dagger (†) and have their own section, as well.

The copy-text has a few **handwritten notes** near the beginning. In each case, these notes are cryptic, illegible, or offer no real clarity concerning the text. As such, they have been omitted.

Latin text has been translated into English and set off with {braces}, preserving the style, Roman or Italic. An attempt has been made, where possible, to preserve page layout in light of changes in line length and word order between the two languages.

Original punctuation has been preserved except where it might impede understanding. Where uncontroversial, changes have been made silently to avoid cluttering the page with minutiae. If a change is conjectural, it is treated as any other conjectural emendation.

Because they can be difficult, even confusing, to read, **archaic letterforms** have been silently modernized. When the original printing has used a “VV” to represent a “**W**,” this edition silently changes this to a “W.”

The edition maintains the **capitalization** of the original because, while sixteenth-century capitalization seems strange to modern readers, it does not inhibit readability and helps to preserve the feeling of reading a book from an earlier time. One could also imagine that this information might be useful to a later scholar studying typography. This edition does, however, seek to regularize the **spacing** between words. Typesetters in the sixteenth century had to keep their text-blocks justified, and adjusting spacing was one way to achieve that. However, these accidental variations are difficult to measure, and the effort of doing so would neither enhance the reading experience nor provide any particularly valuable information to scholars.

For ease of reading, this edition modernizes **spelling**, including the closing of open compounds, such as changing “to day” to “today.” However, in order to preserve somewhat the flavor of the original, the original verb forms, such as *followeth*, have been retained, though their spelling has been regularized.

Despite the tendency to modernize spelling, the edition attempts to keep **archaic words**. Their spelling has been modernized using the Oxford English Dictionary as the model, and where their meaning is unclear a definition from the OED has been included in the glossary.

In the original, the dedication and note to the reader are printed entirely in an italic typeface. For the sake of readability, these two sections of Digges's **front matter** have been rendered in a Times New Roman font.

Thomas Gemini, the printer, has justified the **margins** of the text block, as was standard and necessary when working with movable type. In order to preserve the line breaks, this edition dispenses with justification, which is neither necessary nor particularly desirable in the current format. Some care has been exercised in preserving where words break across lines. Gemini is inconsistent in his **hyphenation at linebreaks**, either out of carelessness or necessity. This edition preserves such inconsistencies.

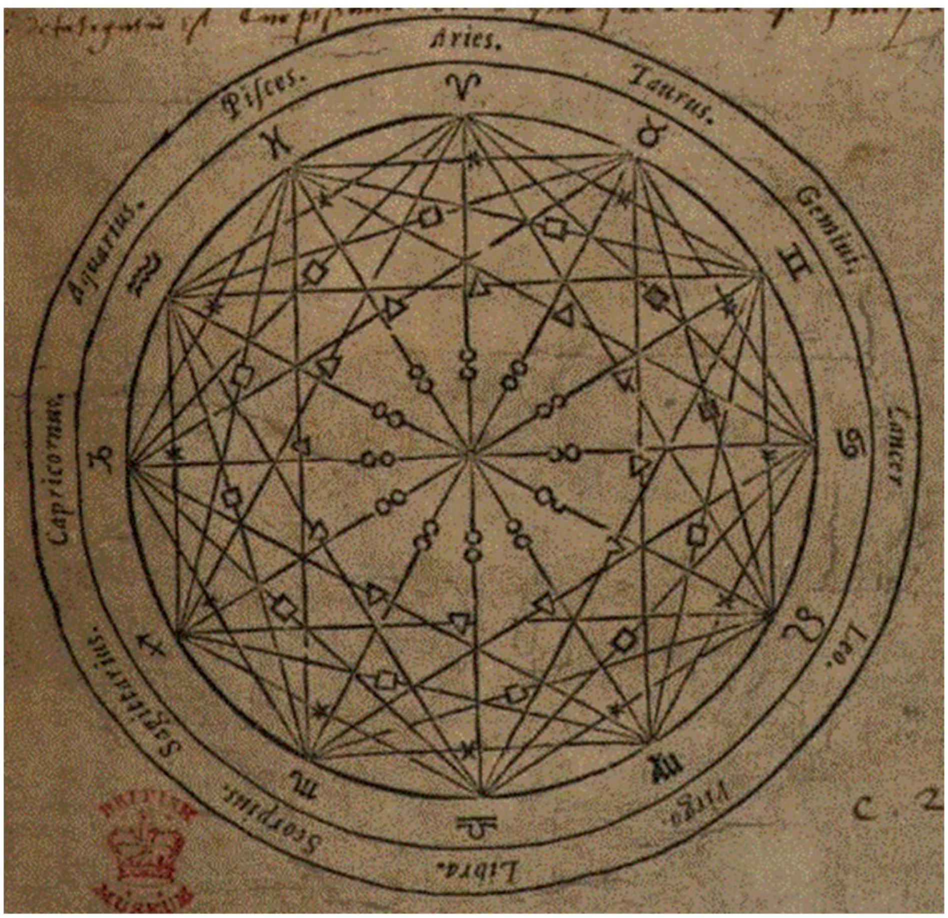
The **running head** of the original has in all cases been omitted.

Gemini uses an overbar to signal when he **abbreviates** words by dropping a nasal consonant. In all such cases, the edition has expanded these abbreviations and signaled this by underlining the missing letter and the letter that supported the overbar.

Printed **marginalia** are placed in the margin in a manner imitating as closely as possible their placement in the original.

Catchwords appear inconsistently throughout. This edition reproduces them at the end of the page when they appear in the text. An attempt has been made to place them in relation to the text block as nearly as possible to their original position, as typography allows.

❧A PROGNOSTICATION OF RIGHT GOOD
effect fruitfully augmented, containing *plain, brief, plea-*
sant, chosen rules, to judge the weather forever, by the *Sun, Moon,*
Stars, Comets, Rainbow, Thunder, Clouds, with other Extraordinary
tokens, not omitting the *Aspects of Planets*, with a brief judge-
ment forever, of *Plenty, Lack, Sickness, Death, Wars, etc.* Openin-
g also many *natural causes*, worthy to be known. To these and
others, now at the last are adjoined, *diverse general plea-*
sant Tables: forever manifold ways profitable,
to all manner men of understanding: therefore
again published by *Leonard Digges*
Gentleman, in the year of our
Lord 1555.
❧ (*) ❧



❧Imprinted at London, within the black
Friars, by Thomas Gemini. 1555.

THE CONTENTS

11 For further knowledge in things following the *Sunday letter* and *Leap year*, is briefly declared by a *Table*, at no time to be altered.

12 A table, as general for the *Prime** and *Epact**.

13 A table to find the *movable feasts* forever.

14 Then is opened plainly the age of the *Moon** at all times, the *full*, and *quarter*, forever.

15 A table showing continually the true time of *ebbing* and *flowing*, in most coasts of England.

16 Here is also declared forever, how long time the *Moon* shineth, when she *riseth* and *seteth*, with her continuance on the *Horizon*, or earth.

17 A *Table* for the *break* of the day, and *twilight*, and for this country the true hour and very minute of the *Sun rising*, and *going down*, with the just *quantity* or length of every day in the year, and the *length* of the night also.

18 The hour of the night is known by the *Moon*, and diversely.

19 The hour of the day doth plainly appear by *rig[ht shadow]*: that is, by anything directly standing up, and also by *sha[dow] Geometrical*, which is square shadow.

20 The exact hour of the night is pleasantly searched by *Stars* and *Tables* calculated, with an *instrument* appointed for that practice. This instrument is a perfect *Dial* for the day, of all other the ground, whose *making*, *rearing**, *placing*, and use is plainly opened.

21 Before the peculiar *Calendar*, you have a brief *Calendar* general, containing things commonly desired.

Here endeth the contents.

To the right honorable, Sir Edward Fines, of the noble order
of the Garter Knight, Lord Clinton and Saye, etc.
Leonard Digges wisheth continuance
of health, and daily increase
of honor. (,:,)

SIth* my late troubles (right honorable, and singular good lord) my duty hath made me careful to procure, that some fruit of my studies might declare me thankfully minded, toward your lordship, among other honorable, to whom I owe myself, with all my endeavor, and fruits of study. For the performance whereof, not only your lordship's late talk of a Prognostication, seemed to make that argument fittest: but also the manifest imperfections, and manifold errors yearly committed, did crave the aid of some that were both willing, and able to perform the truth in like matters. I thought it therefore worthy the labor, truly and briefly to collect many things, both necessary, and pleasant, as well for Nobility as others: and to adjoin them to my general Prognostication, imprinted the year 1553. augmenting diverse ways the same: and more orderly placing such as were before set forth. Your honor shall here receive, in this little book, by infallible rules taught for ever, a truth of all such things as heretofore have been put forth of other for one year's profit only, compelled thereby of necessity to make a yearly renewing of them: whereupon errors many increased. You shall have diverse other conclusions general, of none before attempted. These (right honorable lord) according unto my duty, I do present, and beseech you in good worth to receive: and have willed them to pass under protection of your Lordship's name: that if to any, any commodity ensue thereby, such as receive it, may have cause to further me, in yielding thanks to your honor.

To the Reader.

TO avoid (Gentle reader) the yearly care, travails*, and pains of other, with the confusions, repugnancies, and manifold errors, partly by negligence, & often through ignorance, committed: I have again briefly set forth a Prognostication general, forever to take effect: adjoining thereto divers profitable collections, & many pleasant conclusions, easy of all willing ingenious to be perceived Here note (Reader) whereas the elevated Pole, & Meridian should be considered: in this work it is performed for London: because [I wish by] this Meridian, Situation, or Clime the exact truth of things. If any yearly practices in like matters, agree not with my calculations: be assured, they are false, or at the least for other Elevations, or Meridians supputated*, and therefore little serving thy purpose. And that the late rude inventions, and gross* devices of some (this year, and two years past, published) might be of them perceived, then filed, and so serve to some profit: I have purposed even now to put forth a book named Panauges†, well serving their turn, and so generally and most exactly all Europe, pleasant, profitable to the learned, and no small delight to all manner men. Another book is also ready to come to thy hands, titled Tectonicon, a treasure unto the Masons, Carpenters, and Land-meters: correcting their old errors, wrongfully reckoned of them as infallible grounds: teaching faithfully, sufficiently, and very briefly, the true mensuration* of all manner land, timber, stone, board, glass, etc.: and at the end containing an Instrument Geometrical, appointed to their use. Take in good worth these labors (Loving reader) and look shortly for the pleasant fruits Mathematical, even such as have been promised by my friends, and partly by me. Neither shall my desire to profit here stay: but intendeth farther to proceed, if these seem accepted As the good will of Printers not had, hath kept the aforesaid from you: so I trust the willing mind and excellency of Thomas Gemini, shall bring them shortly unto you. Certes* my hope is, while life remaineth, not to be unfruitful to this commune wealth, with study, and practice.

Against the reprovers of Astronomy, and scien-
ces Mathematical.

I Am diversely occasioned, loving Reader, somewhat to write in the commendation of the *Mathematicals*, which needed not: but only to open the foolish rashness, and rash foolishness of such, which of late have in writing dispraised these goodly arts. It is an old said saw, and true: {*Science does not have an enemy unless he/she is ignorant*}. But to avoid tediousness, and chiefly for the more satisfying, I refer all of that sort, which have tasted any learning (the rest not regarded) to the first part of famous *Guido Bonatti, de utilitate Astronomiae in communi*[i]*:* where he writeth {*against those who say that the science of stars cannot be known by anyone;*[ii] *against those who have said that the science of stars is not useful but rather is damnable, etc;*[iii] *against those who contradict the judgments of Astronomy and who detest them, ignorant of their dignity because it is not lucrative*[iv]}. Also for brevity, I appoint all nice divines, or (as *Melancthon*[v] termeth them) {*Epicureans of Theology*}, to his high commendations touching Astronomiæ, uttered in his epistles to *Simon Grynaeus*[vi], to *Schonerus*[vii], and at the peroration of *Cardano*[viii] five books, where he showeth how far wide they allege the scriptures against the *Astronomer*, which make wholly with the *Astronomer*. *Melancthon* writeth and affirmeth, {*It is arrogance joined to the height of foolishness to hunt for any ceremony of glory from the pursuit of arts, which are from the grave authority of the doctors etc., and which are the prescriptionsof prudent people*}. He calleth it {a *manifest type of insanity*}*,* declaring {*this is a job more for a doctor than a geometer*}, advising the learned not to give ear unto their folly. {*Let's (he said) play the fool with an Epicurean*}. Which counsel lo, I follow. Now therefore, you enemies of all good doctrine, either give an overthrow, and that with your pen, or let famous *Guido*, or learned *Melancthon* satisfy. If neither: certes* I will shortly (God sparing life) take some pain in publishing the wonderful unknown pleasant profits of these dispraised high knowledges, and by that means to enforce silence. Now in few, for thy encouragement in these, thus I say and truly, the ingenious learned, and well experienced circumspect student *mathematical* receiveth daily in his witty practices, more pleasant joy of mind, than all thy goods (how rich so ever thou be) can at any time purchase. {*With sweet passion the wise man embraces that thing which is beautiful,*

which

{They who simply don't understand them censure them.}

which is pure, which is divine, and which is in no way mortal. To say much in few words (believe me) it will be sweet to be. Now to end, that learned *Guido*, that excellent *Guido Bonatti*, showeth what *Astrology* or *Astronomy* is, and ought not sayeth he, by any mean to be reprehended, in that the most wisest, yea, the holy fathers have practiced that science. He proveth it one of the chief sciences *Mathematical*, by the authority of the best learned, and by *Aristotle* in his *Posteriorum*[ix]. How cometh it to pass loving Reader, saying it is a noble science, {*and science is a true concept of conclusions, by which, on account of a demonstration*[†] *we might firmly assent*}, that it is counted vain, and of so small strength. The secret truths and most pleasant profits therein not desired, yea, utterly despised, and of some busy biting bodies rejected as very lies. Let no man doubt ignorance, the great enemy of all pure learning hath wrought this. {*For the common people call this an uncertain art, on account not of any errors in the art itself, but rather in the ignorance of unlearned men, who think with fear and who everywhere blabber on about their own delights*}. Thus I leave indigestly* farther to trouble: favor me as I tender the furtherance of good learnings, profitable to a commonwealth. Fare most heartily well, unfeigned good Christian Reader.

{The foolish despise this and fight against it: Those who contradict it are seeking advancement, and those who curse it are silly.}

HOW TO JUDGE WEATHER by the Sun rising, or going down.

THe *Sun* in the *Horizon*, or rising, clear and bright, showeth a pleasant day: but thinly overcast with a cloud, betokeneth foul weather. Also at the going down, the body diverse colored or red, and about dispersed with like clouds, the beams red, and of length, pronounce great winds the next day from that part. Blackness in the *Sun* or *Moon* betokeneth water: red, signifieth wind. The element red in the evening, the next day fair: but in the morning red, wind and rain. Also the *Sun* beams spotted, green, pale, or black, gathered to a cloud, signify rain. Further the *Sun* at the setting plainly seen without any cloud, declareth a fair night to ensue. Here note, Ptolemy[x] willeth us diligently to observe the circle, or circles about the *Sun*. If it be clear, and the circle of no continuance, behold fair weather: if many of them, wind. Winds more vehement are signified, if that the circles be somewhat red, here and there broken: but these obscured, thick, and black, look for cold, wind, and snow. What is spoken of the *Sun*, touching the circles, the same is meant of the *Moon*. Note here that greater winds chance in the day, than in the night.

{On observing meteors.}*

Note.

How weather is declared by the color of the Moon: and by the nature of the sign wherein she is.

IF the *Moon* in the third of her change*, yea three days before the full, or in the midst of the quarter, be found of pure light: no thing compassing her, the end direct up, she promiseth fair weather, but bent to red color, provoketh wind. The *Moon* pale, or somewhat inclined to black, obscure or thick, threateneth rain. Also by the nature of the sign, weather may be judged, thus, according to *Stöffler,*[xi] *Monteregius,*[xii] *Leupoldus*[xiii], and famous *Guido Bonati*, with others well-travailed* in the mutations of air. Consider the

{If the moon is red [wind] blows; if it's pale, it rains; if it's white, it will be calm.}

♈ ♌ ♐ hot,
♉ ♍ ♑ earthy.
□ ♎ ♒ windy.
♋ ♏ ♓ watery.

nature of the sign where the *Moon* is, at the change*, quarter, and full. If she be in hot & dry signs, as *Aries, Leo, Sagittarius*, in winter a good token of fair weather: in summer, a great signification of immoderate heat: if in earthy, cold and dry signs, as *Taurus*, *Virgo*, and *Capricorn*, in winter judge cold, frost, and snow to ensue: but in Summer temperate weather. In airy and windy signs, as *Gemini*, *Libra*, and *Aquarius*, much wind. If in watery cold and moist signes, as *Cancer*, *Scorpius*, and *Pisces*, in winter wet weather: in summer a pleasant temperature.

Also, the *Sun* in *Aquarius*: the *Moon*, at the change* there, or in *Sagittarius*, or at the full in *Leo*: betokeneth rain. The *Sun*, in *Pisces*, or in *Aries*: the *Moon*, in *Virgo*, *Libra*, or *Sagittarius*: signifieth rain, especially in watery dwellings. The *Moon* in *Aquarius*, or *Pisces*, look for change of weather: then chiefly she troubleth the air. The *Moon* also at the change*, or rather at the full, in *Aries*, *Libra*, *Scorpio*, or *Pisces*, tempestuous weather followeth. The *Sun* in *Aquarius*, in *Aries*, *Libra*, or *Scorpio*, but chiefly in *Leo*: the *Moon*, then at the full, and that after rain or mistings: look for lightning, thundering. &c. Also the *Sun*, or *Moon* found in *Pisces*, without all help of *Mars*, it betokeneth abundance of rain, lightning, thunder. &c. To conclude the *Moon*, in *Cancer*, *Leo*, *Capricorn*, or *Aquarius*, aided with any aspect, but chiefly with the opposition or quadrate of *Venus*, rain followeth.

The judgment of weather by stars.

{When the greatest things appear, then indeed the middle atmosphere grows in moisture.}

BEhold the stars whose magnitude you know best. If they appear of much light, in bigness great, more blazing than they are commonly, it betokeneth great wind or moisture in that part where they show: in winter, cold and frost. When stars seem to run in the element, it showeth wind. Affirm also alteration of weather if they be few in number, cloudy, and of little light. Further when dim stars appear with long fiery tails, judge winds, and great drought: the more in number, the greater effect. When stars in the night (as it is said) shoot, or seem to fall, it argueth wind in that part: If in diverse places, inordinate winds: if in all places, then pronounce Winds, Thunder, Lightnings, yea weather most tempestuous.

The signification of Comets

Comets signify corruption of the air. They are signs of earthquakes, of wars, changing of kingdoms, great dearth of corn, yea a common death of man, and beast.[xiv]

{Concerning the marvel of comets, read Cardano. book 4. fol. 83.}

How by the clouds change of weather is perceived.

IF thick clouds resembling flocks, or rather great heaps of wool, be gathered in many places, they show rain. Also when gross*, thick, dark clouds, right over the north part, or somewhat declining to the west, are close with the earth, immediately followeth rain. If they appear like hills, somedeal from the earth, a good token of weather overpassed. Black clouds, signify rain: white clouds appearing in winter, at the Horizon, two or three days together, prognosticate cold, and snow.

Of the rainbow and his effect, touching alteration of air..

IF in the morning the rainbow appear, it signifyeth moisture, unless great drought of air work the contrary. If in the evening it show itself, fair weather ensueth: so that abundant moist air take not away the effect. Or thus.

The rainbow appearing, if it be fair, it betokeneth foul weather: if foul, look for fair weather. The greener, the more rain: redder, wind.

{There will not be a rainbow unless it [stands] before the sun. It will not appear unless the clouds become less dense or thicken.}

Of Thunders: what they signify.

THunders in the morning signify wind: about Noon, rain: in the evening great tempest. [Some] write (their ground I see not) that Sunday's thunder should bring the death of learned men, Judges, and others: Monday's thunder, the death of women: Tuesday's thunder, plenty of grain: Wednesday's thunder, the death of harlots, and other bloodshed: Thursday's thunder, plenty of sheep, & corn: Friday's thunder the slaughter

{A sign of future wars.}

of a great man, and other horrible murders. Saturday's thunder a general pestilent plague, and great death.

How weather is known after the change of every Moon, by the prime days.*

SUnday prime, dry weather. Monday prime moist weather. Tuesday prime, cold and windy. Wednesday prime, wonderful. Thursday prime fair and clear. Friday prime, mixed weather. Saturday prime, moist weather.

Now ensueth extraordinary tokens for the knowledge of weather.

Common tokens of weather, meet for all manner wits.

SOme have observed evil weather to follow, when watery fowls leave the sea, desiring land: the fowls of the land flying high: the crying of fowls about waters, making a great noise with their wings: Also the seas swelling with unaccustomed waves: If beasts eat greedily: if they lick their hooves: if they suddenly move here and there, making a noise, breathing up to the air with open nostrils: rain followeth. Also the busy heaving of moles, the appearing or coming out of worms: hens resorting to the perch[†] or rest covered with dust, declare rain. The ample working of the spinner in the air: the ant busied with her eggs: the bees in fair weather not far wandering: the continual prating of the crow, chiefly twice or thrice quick calling, show tempest. When the crow or raven gapeth against the sun, in summer, heat followeth. If they busy themselves in preening or washing, and that in winter, look for rain. The unaccustomed noise of poultry, the noise of swine, of peacocks, declare the same. The swallow flying and beating the water: the chirping of the sparrow in the morning, signify rain. Rain suddenly dried up: woody coverings straighter than of custom: bells heard further than commonly: the wallowing of dogs: the alteration of the cock crowing: all declare rainy weather. I leave these, wanting the good ground of the rest. If the learned be desirefull of the toforsayd, let them read grave Virgil *primo Georgicorum At Bor*. &c.[xv]

There be a multitude of other not extraordinary but of the best

known

known causes: many for brevity here omitted: the more part not mentioned, because they pass the capacity of the common sort, upon all the which the *Astronomer* doth well and learnedly conclude. I doubt not there be also some time unknown matters, mitigating the aforesaid, or provoking tempests unlooked for, which neither experience, nor learning hath established. How unkind (these considered) yea how far from worthy thanksgiving are they, which in general headily do blame, checking bitterly the *Astrologer*, with these judiciary maters, (the least part among a number of his most certain doings) when things fortune contrary to expectation? Understand gentle reader: the consent of a multitude famously learned is their buckler, even in these maters judiciary: who have weighed a long time prudently, the great strengthen, the vehement force, and marvelous natures, of all erratical and celestial constellations, with their *Angles, Radiations, Aspects, Affections, Stations, Progressions, Defections, Dispositions, Applications, Preventions, Refranations*, Contrarieties, Abscissions* Conjunctions, Quadratures*,* and *Oppositions. &c.* Therefore extreme folly, yea mere madness doth he utter, which embraideth* or backbiteth these knowledges, not remembering the great, and manifold benefits, had through them, and that with most certainty in all other doings.

What *Meteoroscoper**, yea who learned in maters astronomical, noteth not the great effects at the rising of the star called the *Little dog*? Truly the consent of the best learned do agree of his force: yea *Pliny*, in his history of nature[xvi] affirmeth the seas then most fierce, wines to flow in cellars, standing waters to move, dogs inclined to madness then most wood*. Farther these constellations, *Orion, Arcturus, Corona*, rising provoke tempestuous weather: the *Kid* and *Goat*, winds. *Hyades* or *Succulae* rain. What *Meteorologer* consenteth not to the great alteration and mutation of air at the conjunction, opposition, or quadrate aspect of *Saturn*, with either two lights? Who is ignorant, yea meanly travailed* in *Astronomy*, that *Jupiter*, with *Mercury*, or with the *Sun*, enforceth rage of winds? what is he that perceiveth not the fearful thunders, lightnings, and rains, at the meeting of *Mars*, and *Venus*, or *Jupiter*, and *Mars*? &c. Leave for shame to impugn these judicials strongly authorized. He that any other part carpeth may seem more than mad. All truth, all experience, a multitude of infal-

{*Rising of the little dog.*}

{*Rising of Orion, Arcturus, Corona, the kid, Succulae. ♄. ☌. □ & ☍ with ☉ or ☽. ♃. ☌. □ & ☍. with ☿ with ☉. Or ☌ ♂ with ♀ even ☌ ♃ with ♂.*}

lible grounded rules are against him. {*It is clear to all what is known, that the motion of the sky, the rising & setting of signs*†, *the aspect, & conjunction of planets, the eclipses of lights. &c have a certain, determinate and infallible cause. Who of sane mind denies that their effects often reveal, naturally, wars, hunger, hailstorms, perturbations of the air, commotions of the elements, movements of the earth,*† *and other like things? With their natural causes arranged, & not impeded, the effect follows.*}

The learned that listeth* ingeniously to prognosticate of weather, will not only discreetly weigh all before written, but consider also with them the Strength and Aspects of the Planets following, and their Combustion* in the .12. Signs, with the Conjunctions of fixed Stars, Mansions of the *Moon*, the Ascendent, Climes. &c. Also the times or quarters of the year must be noted diligently, (as ensueth) and judgment accordingly pronounced.

Of the year divided in four quarters.

♈ ♉ ♊ *power of the breast.*

♋ ♌ ♍ *power over yellow colors.*

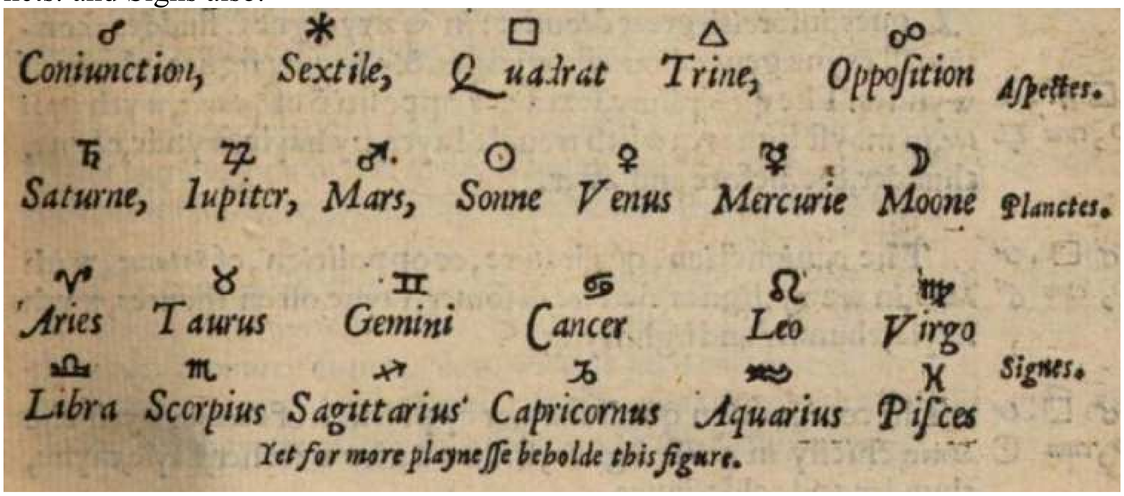
♎ ♏ ♐. ♑ ♒ ♓ *power over all flames.*

THe springtime is hot, and moist: and continueth so long as the *Sun* is in *Aries*, *Taurus*, and *Gemini*: which is from the tenth of *March* unto the twelfth of *June*. The summer is hot and dry, counted from the beginning of *Cancer*, to the end of *Virgo*, that is, from the twelfth of *June*, to the fourteenth of September. Harvest is cold and dry: that is from the beginning of *Libra*, unto the end of *Sagittarius*: counted from the .xiiii. of *September* to the twelfth of December. Winter is cold and moist: continued from the beginning of *Capricorn*, to the end of *Pisces*: that is from the twelfth of *December*, to the tenth of *March*.

Now follow the aspects of the planets, for the better judgement of weather. Before I declare of planets, and the signification of aspects, it behooveth briefly to open what I call planets, and what aspects, and how they are charactered and figured. Understand there be seven moveable stars, pleasant to the sight, called planets. The highest *Saturn* .♄. Then *Jupiter* .♃. *Mars* .♂. *Sun* ☉. *Venus* .♀. *Mercury* ☿. and the *Moon* ☽ next to the earth. Now when I desire to express *Saturn*, I write this figure ♄: for *Jupiter*, this ♃: For *Mars*, this ♂. Thus of the others as their characters declare. All radiations or aspects are expressed as follow. A Conjunction thus figured ☌: and it is, when another planet is joined with the *Sun*, or *Moon*, or others among themselves, within one degree, or

less.

less. The Sextile aspect or radiation is thus expressed ✶: and
it is within 60. degrees the one from the other. The Quadrate aspe-
ct thus □: 90 degrees distant. The Trine thus △: separated .120.
degrees. The Opposition thus ☍: 180. degrees, the one distant from
the other. Lo here they follow in order: the characters of the Pla-
nets: and Signs also.

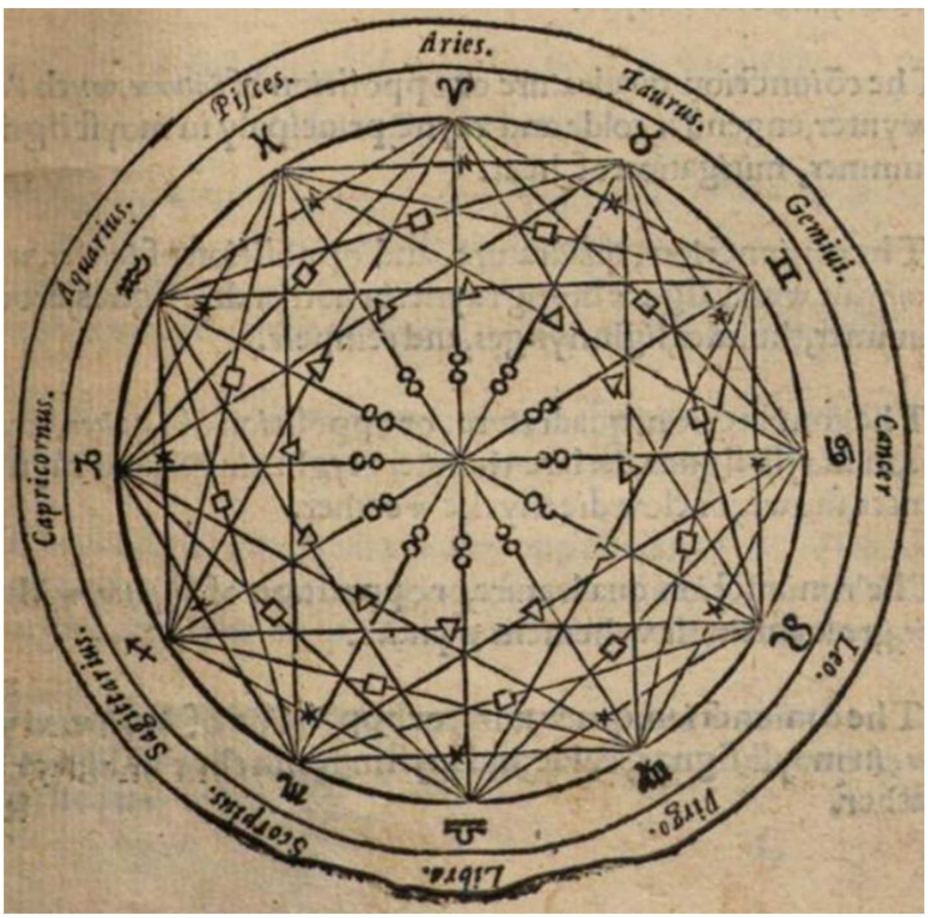


☌ Coniunction, ✶ Sextile, □ Quadrat, △ Trine, ☍ Opposition — *Aspectes.*

♄ Saturne, ♃ Iupiter, ♂ Mars, ☉ Sonne, ♀ Venus, ☿ Mercurie, ☽ Moone — *Planetes.*

♈ Aries, ♉ Taurus, ♊ Gemini, ♋ Cancer, ♌ Leo, ♍ Virgo, ♎ Libra, ♏ Scorpius, ♐ Sagittarius, ♑ Capricornus, ♒ Aquarius, ♓ Pisces — *Signes.*

Yet for more playnesse beholde this figure.



The signification of aspects of planets among themselves: for the judge-ment of weather.

♄ ☌, with ♃

THe conjunction or meeting of *Saturn* with *Jupiter*, in fiery si-gns, enforceth great drought: in watery signs, floods, continual rain, general overflowings. &c. in airy signs, plenty of winds. The quadrature*, sextile, or opposition of *Saturn*, with *Jupiter* in moist signs causeth troubled air, by hail, wind, rain, thunder, &c. before and after.

♄ □ ✶, & ☍, with ♃

♄ ☌ □, & ☍, with ♂

The conjunction, quadrature*, or opposition, of *Saturn*, with *Mars*, in watery signs, declare in summer, rain, often showers, with hail, thunder and lightning.

♄ ☌ □, & ☍, with ☉

The conjunction, quadrature*, or opposition of *Saturn*, with the *Sun*, chiefly in cold signs, show dark weather, hail, rain, thunder, and cold days.

♄ ☌ □, & ☍, with, ♀

The conjunction, quadrature*, or opposition of *Saturn*, with *Venus*, in winter, engender cold and rain, principally in moist signs: in summer, mitigation of heat.

♄ ☌, □ & ☍, with ☿

The conjunction, quadrature*, and opposition of *Saturn*, with *Mercury*, in watery signs bring rain: in hot or dry signs, drought: in summer, thunder, lightnings, and tempest.

♃ ☌, □ & ☍, with ♂

The conjunction, quadrature*, or opposition of *Jupiter*, with *Mars*, in moist signs, declare thunders lightnings, and rain: in winter, snow, or cloudy thick weather.

♃ ☌, □ & ☍, with ☉

The conjunction, quadrature*, or opposition of *Jupiter*, with the *Sun*, great and most vehement winds.

♃ ☌, □ & ☍, with ♀

The conjunction, quadrature*, or opposition of *Jupiter*, with *Venus*, in moist signs, cold and mistings: in the rest signs, fair weather.

The

The conjunction, quadrature* or opposition of *Jupiter*, with *Mercury*, great winds. *♃ ☌ □ & ☍, with ☿*

The conjunction, quadrature* or opposition of *Mars*, with the *Sun*, in fiery signs, drought: in watery, thunder, rain. *♂ ☌, □ & ☍, with ☉*

The conjunction, quadrature* or opposition of *Mars*, with *Venus*, in moist signs, rain, and tempest. *♂ ☌ □ & ☍, with ♀*

The conjunction, quadrature* or opposition of *Mars*, with *Mercury*. in hot signs, great heat: in dry signs, drought: in watery, rain: sometimes thunders, lightnings, with sudden fierce winds. *♂ ☌ □ & ☍, with ☿*

The conjunction, quadrature* or opposition of *Venus*, with *Mercury* causeth rain: in summer they provoke tempest, the more if they agree in watery signs. Note what is said of the conjunction, quadrature* or opposition, the same is also meant of the Sextile and Trine: but they are of less signification, so the learned noteth. *♀ ☌ □, & ☍, with ☿*

A declaration of weather by aspects of the Moon with planets.

THe conjunction quadrature* or opposition of the *Moon*, with *Saturn*, in moist signs, bringeth a cloudy day, cold air, according to the nature of the sign: if she go from *Saturn*, to the *Sun*, by conjunction or otherwise, harder weather ensueth. *☽ ☌ □, & ☍, with ♄*

The conjunction, quadrature* or opposition of the *Moon* with *Jupiter* in *Aries*, or *Scorpio* showeth fair, white dispersed clouds. *☽ ☌ □, & ☍, with ♃*

The conjunction, quadrature* or opposition of the *Moon* with *Mars* in watery signs rain: in hot signs, diverse colored red clou ds are made, all the element over: in summer, often thunder. *☽ ☌, □ & ☍ with ♂*

The conjunction, quadrature* or opposition of the *Moon* with the *Sun* in moist signs, rainy weather: the more if the *Moon* go from the *Sun* to *Saturn*. *☽ ☌, □ & ☍ with ☉*

☽ ☌ □ & ☍ with ☿

The conjunction, quadrature*, or opposition of the *Moon* with *Mercury*, in moist signs showeth rain and wind, the more when the *Moon* passeth from *Mercury* to Jupiter: then great winds follow.

How weather is judged by the Oriental and Occidental station of Planets, with their combustion in the .12. signs celestial.
First of the planets in Aries.

ħ in ♈. What these terms combust Oriental, and Occidental, mean.

S*ATURN* in *Aries*, under the beams of the *Sun*, that is to say, combust*, maketh a cloudy dark troubled air: Oriental, I mean in the morning appearing before the *Sun*, fair weather: Occidental, that is to say, showing himself after the *Sun* going down, betokeneth great winds.

♃ in ♈

Jupiter in *Aries* combust*, a token of rain: being Occidental, it bringeth clouds, and dews: Oriental, fair, pleasant weather.

♂ in ♈

Mars in *Aries* combust* and Occidental, good weather: contrary Oriental.

♀ in ♈

Venus in *Aries* combust*, Occidental moistness, great winds: Oriental thunders, and rains.

☿ in ♈

Mercury in *Aries* combust* tempe[st], Occidental, and Oriental, fair windy weather.

Of the planets [in] Taurus.

ħ in ♉

SATURN in *Taurus* combust*, a[n]d stationary, bringeth thick clouds, thunders, and troubleso[m]e weather.

♃ in ♉

Jupiter in *Taurus* combust*, indifferent [w]eather: Occidental, pleasant showers.

♂ in ♉

Mars in *Taurus* combust*, a quiet air: but [O]riental wind.

♀ in ♉

Venus in *Taurus* combust* thunders, &c. Occ[id]ental fair.†

Of the

Of the planets in Gemini.

SATURN in *Gemini* combust*, and Occidental, drought. ♄ in ♊

Jupiter in *Gemini* combust*, a good signification. ♃ in ♊

Mars in *Gemini* combust* and Occidental, heat. ♂ in ♊

Venus in *Gemini* combust* Occidental, wind. ♀ in ♊

Mercury in *Gemini* combust*, wind. ☿ in ♊

Of the planets in Cancer.

SATURN in *Cancer* combust*, dark weather, great winds and troublesome weathers: Occidental calmer. ♄ in ♋

Jupiter in *Cancer* combust* bringeth calm pleasant weather. ♃ in ♋

Mars in *Cancer* combust*, great heat. ♂ in ♋

Venus in *Cancer* combust*, a quiet calm time. ♀ in ♋

Mercury in *Cancer* combust*, tempestuous weather, chiefly on the sea: Occidental calmer. ☿ in ♋

Of the planets in Leo.

SATURN in *Leo* combust*, maketh winds and mistinges. ♄ in ♌

Jupiter in *Leo* combust*, pleasant winds. ♃ in ♌

Mars in *Leo* combust*, Occidental, drought. ♂ in ♌

Venus in *Leo* combust*, drought. ♀ in ♌

Mercury in *Leo* combust*, winds. ☿ in ♌

Of the planets in Virgo.

SATVRN in *Virgo* combust*, is a significator of infirmities. ♄ in ♍

♃ in ♍ *Jupiter* in *Virgo* combust*, manifesteth abundance of things.

♂ in ♍ *Mars* in *Virgo* combust*, like unto Saturn.

♀ in ♍ *Venus* in *Virgo* combust* drought: Oriental contrary.

☿ in ♍ *Mercury* in *Virgo* combust*, drought, raging seas: Occidental drought.

Of the Planets in Libra.

♄ in ♎ SATURN in *Libra* combust*, showeth infirmity of sight: Oriental, cold winds.

♃ in ♎ *Jupiter* in *Libra* combust*, indifferent weather.

♂ in ♎ *Mars* in *Libra* combust*, bringeth moisture.

♀ in ♎ *Venus* in *Libra* combust*, moist air.

☿ in ♎ *Mercury* in *Libra* combust*, winds.

Of the Planets in Scorpio.

♄ in ♏ SATURN in *Scorpio*[†] combust*, cold air: Occidental frost: Oriental cold, North winds.

♃ in ♏ *Jupiter* in *Scorpio* combust* rain: Occidental, bitter weather▪

♂ in ♏ *Mars* in *Scorpio* combust*, declareth moisture: Oriental, winds.

♀ in ♏ *Venus* in *Scorpio* combust* rain, both Occidental and Oriental.

☿ in ♏ *Mercury* in *Scorpio* combust*, raging weather, chiefly Oriental.

Of the Planets in Sagittarius.

♄ in ♐ SATURN in *Sagittarius* combust*, cold, rainy air: Oriental cold and frost.

♃ in ♐ *Jupiter* in *Sagittarius* combust*, rain: Oriental worse weather.

♂ in ♐ *Mars* in *Sagittarius* combust*, drought.

♀ in ♐ *Venus* in *Sagittarius* combust*, rain: Occidental, wind, and cold.

☿ in ♐ *Mercury* in *Sagittarius* combust* rain: Occidental, clear air.

Of the

Of the Planets in Capricorn.

SATURN in *Capricorn* combust*, signifieth dark weather with South winds: Occidental cold: Oriental North winds. ♄ in ♑

Jupiter in *Capricorn*† combust* moist air: Occidental, increasing the same. ♃ in ♑

Mars in *Capricorn* combust*, cloudy: Occidental some heat. ♂ in ♑

Venus in *Capricorn* combust*, cold air. Oriental rain. ♀ in ♑

Mercury in *Capricorn* combust* rain, both Oriental and Occidental. ☿ in ♑

Of the Planets in Aquarius.

SATURN in *Aquarius* combust* cold air: Occidental dangerous seas: Oriental rain. ♄ in ♒

Jupiter in *Aquarius* combust*, Occidental rain. ♃ in ♒

Mars in *Aquarius* combust* drouth: Occidental and Oriental plenty of winds. ♂ in ♒

Venus in *Aquarius* combust*, cloudy: Occidental hot: Oriental rain. ♀ in ♒

Mercury in *Aquarius* combust*, snow: Occidental more cold: Oriental rain. ☿ in ♒

Of the planets in Pisces.

SATURN in *Pisces* combust*, bringeth clouds: Occidental rain. ♄ in ♓

Jupiter in *Pisces* combust*, Oriental, calm waters. ♃ in ♓

Mars in *Pisces* combust*, Occidental, drought: Oriental lightning, and thunders. ♂ in ♓

Venus in *Pisces* combust*, cold: Occidental disposed to snow. ♀ in ♓

Mercury in *Pisces* combust*, moist air. ☿ in ♓

Thus much of the judgment of weather.

SEEING that I have now sufficiently declared how, by what rules and tokens, weather is judged: I think it convenient to adjoin here a brief collection, how *Plenty, Scarcity, Sickness, Death, Alterations, Troubles, wars, &c.* are forever perceived.

A rule to prognosticate the aforesaid, by the falling of New Year's Day.

Sunday.

IT is affirmed of some, when *New Year's* day falleth on the *Sunday*, then a pleasant Winter doth ensue: a natural Summer: fruit sufficient: Harvest indifferent, yet some wind and rain: many marriages: plenty of wine and honey: death of young men, and cattle: robberies in most places: news of prelates, of Kings: and cruel wars in the end.

Monday.

On *Monday*, a winter somewhat uncomfortable: Summer temperate: no plenty of fruit: many fancies and fables opened: Agues shall reign: Kings and many others shall die: marriages shall be in most places: and a common fall of gentlemen.

Tuesday.

On *Tuesday* a stormy Winter: a wet Summer: a diverse Harvest: Corn, and fruit indifferent: yet herbs in gardens shall not flourish: great sickness of men, women and young children: Beasts shall hunger starve, and die of the botch*: many ships, Galleys, and Hulks, shall be lost: and the bloody fluxes shall kill many men: all things dear, save corn.

Wednesday

On *Wednesday*, Lo a warm Wynter: in the end, snow and frost: a cloudy Summer: plenty of fruit, of corn, Hay, Wine, and Honey great pain to women with child, and death to infants: good for sheep: news of Kings: great wars: battle and slaughter toward the mids*.

Thursday.

On *Thursday*, Winter and Summer windy: a rainy Harvest: therefore we shall have overflowings: much fruit: plenty of Honey: yet flesh shall be dear: Cattle in general shall die:

great

great trouble, wars &c: With a licentious life of the feminine sex.

On *Friday*, Winter stormy. Summer scant pleasant: Harvest indifferent: little store of fruit, of Wine, and Honey: Corn dear: many bleary eyes: youth shall die: Earthquakes are perceived in many places, plenty of thunders, lightnings, and tempests: with a sudden death of cattle, *Friday.*

On Saturday, a mean Winter: Summer very hot: a late Harvest, good cheap garden herbs: much burning: plenty of Hemp, Flax, and Honey: old folk shall die in most places: Fevers and Tertians* shall grieve many people: great muttering of wars: murders shall be suddenly committed in many places, for light matters. *Saturday.*

NOw that I have opened diverse ways, both for the learned and unlearned, how weather to come at all times may be well judged and known &c: I thought it meet, for farther knowledge therein, not to omit here, the natural causes of such and so many alterations of air. Lo, therefore orderly they follow.

Natural causes, conducing to all the aforesaid, ever to be had in memory of the wise: and first of the Rainbow.

THe Rainbow is the shining, and rebounding of beams of light, that turn to the contrary vapor again, in the cloud. It declareth sometime rain, and many times fair weather: when the one, and how the other, is before opened.

Of Rain.

Rain

{*Why it rains stones, read Pliny, bk, 2, Ch. 44.*}

RAin is a cold vapor. an earthy humor: or fumosities, out of waters or earth drawn up by the virtue of the Sun, to the nether part of the middle space of the air: there through cold thickened, then dissolved: thus engendered falleth on the earth. Here I leave to speak of miraculous rains, as Milk, Blood, Flesh, Yarn Wool, &c. For more satisfying in these, read *Pliny* in the second book .58. Chapter.[xvii]

Of Frost and Dew.

{*Dew in summer Becomes frost In winter.*}

A Cold moist vapor, a little way drawn up in the day, thro ugh faint heat of the *Sun*, descendeth in the night, dissolved on the earth, there congealed, or resolved into water, the one cal-led Frost, the other Dew. The last is a sign of fair weather, in the spring or Harvest.

Of Snow.

{*Snow is moderate moisture con-densed.*}

IT is a moist vapor, drawn up to the middle region of the air, then thickened, and frozen into the body of a cloud. So congealed, descendeth.

Of Hail.

{*Hail is rain that congeals upon falling.*}

A Cloud resolved into water, in the fall congealed, maketh Hail. The higher it cometh from above, and the longer it tarrieth in the air, the rounder hail.

Of winds.

{*Material of wind therefore, is a hot & dry ex-halation.*}

Wind is a multitude of dry exhalations, drawn up from the earth: and above the earth, enforced here and there.

Of earthquakes, in the most quiet time.

{Just as there is thunder in a cloud, there is a tremor in the earth.}

PLenty of winds, entered into holes, cones, or caves of the earth, which absent from above the earth, causeth quietness: the violent bursting out of them (the earth closed again) is the earth-

earthquake: {*A sign of future wars*}.

Tokens of earthquakes to come.

A Fiery cloud, appearing in the element, like a little pillar, is a token of earthquakes to come. The obscurity or darkness of the *Sun*, without clouds, and strangely colored, bloody or otherwise, is a token of earthquakes.

{*Signs of the movement of the earth.*}

Also, when Well water and others are troubled, or salt, or infected by savor &c.

A great quietness of air, by land and sea, and chiefly the long absence of winds.

Also, strange noises heard, as clamors of men, rushing of harness, mournings, lamentations &c. All these have been observed, to signify earthquakes at hand.

Of Thunders and lightnings.

THunder is the quenching of fire, in a cloud. Or thunder is, an exhalation hot and dry, mixed with moisture, carried up to the middle region, there thickened and wrapped into a cloud: of this hot matter, coupled with moistness, closed in the cloud, groweth a strife, the heat beating and breaking out the sides of the cloud, with a thundering noise: the fire then dispersed, is the lightning. Thus for the learned: {*The sound of thunder is what is emitted when a breath strikes a cloud. Lightning is a flame or sudden fire which is born from the collision or rupture of clouds*}. Aristotle affirmeth the lightning after the thunder: but the fire doth first appear, in that the sight is before the hearing. If this satisfy not, read the second of his Meteoron.[xviii] Here followeth a note of lightnings.

{*It is certain that although lightning, is discerned before thunder is heard, they happen simultaneously, Pliny bk. 2. Ch. 56. contra Aristotle.*}

There be three kinds of lightnings, dry, moist and clear.

DRy do not burn, but cleave, depart, or divide. Moist burn not, but alter color. The clear are of marvelous natures. Full barrels by it are emptied. It melteth money in the purse, it breaketh the sword, the purse and scabbard not perished, yea, wax in them unmolten.

Note.

 Of Come-

Of the Comets, or flames in the night.

{*Cause of winds*}

A Comet is a flame, working in a dry, hot, slimy exhalation, drawn up to the highest part of the air. His matter or substance after it is burnt, dispersed provoketh winds.

The natural cause of the Sun eclipsed.

NOthing else is the Eclipse of the *Sun*, but the direct putting the body of the *Moon*, between the *Sun* and the earth, or between our sight and the *Sun*: which chanceth only at the change*.

A Corollary.

Miracle,

BY this gather the darkness at Christ's death, not to stand by natural ecliptical cause: but by supernatural, or miracle. For it was at the full *Moon*, the scriptures witness: which enforced *Dionysius Areopagita*, at the time of his passion, to speak thus: {*Either the God of nature suffered, or creation was destroyed*}.[xix]

The cause of the Moon eclipsed.

{The eclipse of the moon is common, not always in the new moon, but in the caput *and* cauda.*}*

{*Size of all planets in relation to the Earth.*}

{*These things-seem incredible only to those not accustomed to mathematical proofs, &c.*}

THe *Sun* being in the contrary point to the full *Moon*, enforceth the shadow of the earth, then directly put between the *Sun* and the *Moon*, towards the *Moon*, hiding more or less of the *Moon*, as she differeth from the Ecliptical. Some observe pestilent plagues, sudden battle, great dearth, to ensue these eclipses: which all I desire God to avert from his chosen. Many other things by this Eclipse are gathered, as *Longitudes* of countries: the *quantity* of the *Sun*, containing the bigness of the earth 162 times: the *compass* of the earth 21600. miles: whose *thickness*, according to *Archimedes* rule[xx] is, 6872 miles and 8 elevenths of a mile. The quantity of the *Moon* is the 43 part of the earth. The *Sun* containeth the globe of the *Moon* 7000 times. *Saturn* comprehendeth the bigness of the earth 91 times. *Jupiter* 95 times. *Mars* 1 and 10. sixteenths. *Venus* one 37 part. *Mercury* one 32000 part of the earth. Note here, that *Alfraganus*[xxi] affirmeth the least fixed star, perfectly seen, as big, as the whole earth.

{These things}

{T*Hese things will not be marveled at, if you look for the size* of the earth from the longitude of the diameter. The diameter of the sun contains five and a half times the diameter of the earth. And it is in proportion to the diameter of the sun to the diameter of the earth which is of the number eleven to two, five to one half. The cube of the sun contains one thousand three hundred thirty-one such parts while the earth contains eight. A cube of eleven is one thousand three hundred thirty-one. A cube of two, which is the earth, has eight. However often this might be calculated, the cube of the earth is less and the cube of the sun is greater, the proportion of the cube of the sun to that of earth is known, and how much greater the sun is than the earth. We find therefore eight hundred sixty-six in one thousand three hundred thirty-one.}

{The diameter of the sun to the earth measures 11 to 2.}

{The cube 1331 of the earth is 8.}

¶{The diameter of the earth encompasses the diameter of the moon thrice, & two portions of its diameter are five. And so the proportions of the diameter of the earth to the diameter of the moon, which is seventeen to a fifth of triple five. The cube of the number seventeen is four thousand nine hundred thirty. The cube of the number five is one hundred twenty-five. With the greater cube divided by the lesser, we find the number one hundred twenty-five, thirty times nine in four thousand nine hundred thirty: which differs a little from the observations above.}

{The diameter of the earth to the moon measures 17 to 5. The cube of the earth is 4913. The cube of the moon is 125}

How many miles the Moon is from the earth: and every planet from other.

AS some have published, it is from the earth to the *Moon*. 15750. miles.
From the *Moon* to *Mercury*, is 12812. miles.
From *Mercury* to *Venus*, as many miles.
From *Venus* to the *Sun*, is 23437. miles, and a half.
From the *Sun* to *Mars*, is 15725. miles.
From *Mars* to *Jupiter*, is 78721. miles.
From *Jupiter* to *Saturn*, as many miles.
From *Saturn* to the firmament 120485 miles.
The whole sum, from the earth to the firmament is, 280734. miles, and a half.

The natural causes of many Suns or Moons.

THese come to pass, when a thicker cloud is gathered toward the side of the *Sun* or *Moon*: in the which the broken beams of the *Sun*, do leave the fashion and very form of that *Sun*. The first is the very *Sun*: the second and third come of the breaking of the *Sun* beams in the cloud, on the side of the *Sun*. Thus as followeth, sayeth *Pliny* in his second book, of the history of nature, and 31. Chapter. No more *Suns* are perceived in our time than three: and they are never seen, either above or beneath the *Sun*, but on the sides: never in the night, but only at the *Sun* rising, or going down.

Milichius noteth the king of [Poland] to have seen .6 Suns at once.

What is to be chosen or avoided, under every aspect of, the moon: with her signification, in the .xii. signs, touching the same.

{♄ ☌ □ or ☍ with ☽}
THE conjunction, quadrature*, or opposition of *Saturn* with the *Moon*, causeth an evil unlucky day, for all matters. Leave therefore to have to do any manner way: nothing shall prosper, or come well to pass then attempted. Yet the sextile or Trine of
{♄ ✶ & △ with ☽}
Saturn, with the *Moon* declareth a convenient time to till, delve or dig, to sow, to lay foundations, to erect or repair houses yea, a meet time to obtain suits of fatherly farmers. The *Moon* in
{☽ in ♑ or ♒}
Capricorn or *Aquarius*, bringeth this later effect of the sextile and trine.

{♃ ☌, ✶ △ □ or ☍ with ☽}
The conjunction, sextile, trine, quadrature*, or opposition of *Jupiter* with the *Moon*, showeth a fortunate day, chiefly to obtain suits of Kings, noble Princes, Prelates &c, of Lawyers, and Religious persons: and a meet time to study, to journey, to take an ho-
{☽ in ♉ ♌ or ♐}
nest mater in hand. The *Moon* in *Taurus*, in *Leo*, or *Sagittarius*, showeth the same.

{♂ ☌, ✶ △ □ or ☍ with ☽.}
The conjunction, sextile, trine, quadrature* or opposition of *Mars* with the *Moon*, warneth thee not to match thyself that day with warriors: notwithstanding very good, and most meet to finish all manner fiery works: naught to journey: yet most convenient for valiant captains, to work their feat, to lead, encourage, or stomach their soldiers: most unmeet to treat peace, to take servants, or to seek friendship.

{☉ ☌, □, or ☍ with ☽}
The conjunction, quadrature* or opposition of the *Sun* with the *Moon*, declareth a very unhappy day, for all matters: therefore attempt nothing, not any manner suit: neither plant, build, nor journey. Yet the sextile and trine are very fortunate, especially to obtain
{☽ in ♈}
suit of Kings, Princes, and other Nobles. The *Moon* in ♈ enforceth the effect of this later part.

{♀ ☌, ✶, △ □ or ☍ with ☽.}
The conjunction, sextile, trine, quadrature*, or opposition of *Venus* with the *Moon*, causeth a day most apt to obtain all suits of

women:

women: good to woo, to attempt marriage, and to follow all manner pleasures, and pleasant pastimes: not unmeet to hire servants, to let blood &c. The *Moon* in *Libra* or *Pisces*, provoketh the like. *{☽ in ♎ or ♓}*

The conjunction, sextile, trine quadrature*, or opposition of *Mercury* with the *Moon*, promiseth a fortunate happy day, to buy and sell: very good to enter children in liberal arts: an apt time for the versifier: good to use merchandise, to journey, to send embassage, to give accounts, and such like. *{☿ ☌, ✶, △, □, or ☍ with ☽}*

The *Moon* in *Gemini*, *Cancer* or *Virgo*, inclineth even to the same aforesaid. *{☽ in ♊ ♋ or ♍}*

The *Moon* with the Dragon's head, showeth a lucky day for all matters: with the tail joined, contrary. *{☽ with ☊}*

Now ensueth a Table showing what sign the Moon is in, and shall be forever: declaring also the meetest time to let blood, to purge, and to bathe.

THIS Table following, hath at the head seven titles. The first months: the second days: then the prime*: the .12. signs: the titles to let blood, to purge, and to bathe. Here it is to be noted, that those days are good for these purposes, which be signed with this letter G: and those evil days, that are noted with B. Now ensueth the Table, and the whole use of it, and first for the sign, where the *Moon* is.

¶ This Table declareth for euer, in what signe the Moone is, or shalbe at any day in the yeare. It serueth also very wel to let bludde, to purge, and bathe.

Monethes.	Daies.	Prime	The 12. Signes.	To let bludd.	To purge.	To bathe.
Febr. Nouē.	1	3	Aries.	G	B	G
Marche.	2		Aries.	G	B	G
	3	14	Taurus.	B	B	B
Decēbre.	4	6	Taurus.	B	B	B
	5		Gemini.	B	G	
Aprile.	6	17	Gemini.	B	G	
	7	9	Cancer.		G	G
Maie.	8	1	Cancer.		G	G
	9		Cancer.		G	G
	10	12	Leo.	B	B	G
	11	4	Leo.	B	B	G
Iune.	12		Virgo.	B	B	B
	13	15	Virgo.	B	B	B
Iuly.	14	7	Libra.			
	15		Libra.			
	16	18	Scorpius		G	G
	17	10	Scorpius		G	G
Auguste	18	2	Scorpius		G	G
	19		Sagitta.	G		G
	20	13	Sagitta.	G		G
	21	5	Capri.	B	B	B
Septembre	22		Capri.	B	B	B
	23	23	Aquari			G
Ian. Octo.	24	24	Aquari			G
	25	25	Pisces.		G	G
	26	26	Pisces.		G	G
	27	27	Pisces.		G	G

How to find by this Table, the sign where the Moon is forever.

SEek out under the titles of the months, the name of the month, whose day you must look out, right against the month, under the title of days: and there begin to tell downwards, *one, two, three,* &c. to the end, if it so require. And then from the beginning, if need be, until you have reckoned the number of the day that you seek. Look what number it falleth upon in this table, under the title of days: that number keep in mind. Then seek [under] the title of the prime*, the golden number* for that year: right [against] that leftward, under the title of days, begin to tell down[wards], *one, two, three, four,* &c, until you have reckoned the number, [which] you did keep in mind. Against that downwards, on [your] right hand, under the title of *Signs,* is the sign wherein the [*Moon]* shall be that day. Even then under the other titles, you shall find in right order, for *letting blood,* for *purging,* and *bathing,* according as they be noted with G. which is good, and B. signifying bad. Example. The sixth day of *March* in the year of our Lord 1555, I desire to know what celestial sign the *Moon* doth then occupy. I find first the name of the *Month,* that is, *March:* and the day as followeth, in the next order of this table. I begin here to tell, right against my month, at the figure of .2. saying: *one, two, three,* &c. so I have at the end, and count off six days this figure 7. which I keep in mind. Now I must seek out the *golden number*,* for the year aforesaid, under the title of the prime* here, that is 17: against the which, on the left syde is 6. There you must begin again to count, *one, two, three,* &c. until you come unto your number 7. So on your right hand, in the row, or order, you shall see *Virgo,* the celestial sign, that the *Moon,* is in: and after that these three letters, b, b, b, which declare bad or evil to let blood, to purge or bathe, agreeable to the titles in the head. G, there had signified good.

To know what the Moon differeth from the Sun.

D. iiii. Multiply

MUltiply the age of the *Moon*,* by 4, and divide by .10: the quotient showeth the signs, that the *Moon* differeth from the *Sun*: the remainder augmented by .3, bringeth degrees to be added.

Now shall follow, what days in every month are unmeet to let blood, dangerous to suffer wounding, perilous to fall sick, deathly to journey, evil to marry, and naught to take any matter in hand. The whole year after this count following, hath .33. evil days.

The year hath. xxxiii. evil days, general forever.

JANUARY hath eight such days, the .i, t[he .ii, the] iiii, the .v, the .x, the .xv, the .xvii, the .xxix. Drink white wine this month.

February hath three days, the .viii, the .x, the .[xvii]: these not so evil, the .xxvi, the .xxvii, the .xxviii. Eat no [po]tage of oats, or mallows: they are venomous.

March three days, the .xv, the .xvi, the .xix: this not so evil, the xxviii. day. This month, all sweet meats are good.

April two days, the .xvi, the .xxi: these not so evil, the .vii, the viii, the .x, the .xx. Use hot meats, of light digestion.

May three days, the vi, the .xv, the .xx: these not so evil, the iii, the .vi. Rise early, and use breakfast.

June two, the .iiii, the .vii: these not so evil, the .x, the .xv, the .xxii. Sage and lettuce are good to eat. Cold water fasting hurteth not.

July two days, the ,xv, the .xx. Abstain from carnality.

August two days, the .xix, the .xx: these not so evil, the first, the xxix, the xxx. It hurteth not to abstain from potage, and all hot meats, and drinks of spicery.

September two days the .vi, the .vii: these not so evil, the .iii, the iiii, the .xxi, the .xxii. Eat good fruit.

October

October one day, the vi: these not so evil, the. iii, the .xvi, the xxiiii. Good wine is wholesome this month.

November two days, the .xv, the .xix: these not so evil, the. v, the vi, the .xxviii, the .xxix. Bleed not.

December three days, the .vi, the .vii, the .ix: these days not so evil, the .xv, the .xvii, the .xxii. Bleed not over much. Warm not thy legs at the fire.

A conducible note for letting blood.*

LEt blood at no time, without great cause: for it bringeth weakness, and many infirmities. If you do, see it be after good digestion, and fasting, in a fair temperate day. Beware before of all manner *exercise*, *bathings*, *watchings*. and *carnal copulation* &c. After, use fine meats, of light digestion: abstaining from all the aforesaid, until the fourth daye.

{For evil to be diminished, use purgations when it is hot, on account of the lack of moisture.}

These signs are most dangerous for bloodletting, the *Moon* being in them: *Taurus*, *Gemini*, *Leo*, *Virgo*, and *Capricorn*, with the last half of *Libra*, and *Scorpio*. The rest are all good, so the *Moon* bear no dominion in that member, which you cut: as followeth.

Ill to let blood in ♉, ♊, ♌ ♍, ♑,

Behold the figure.

Aries.

Gemini. *Taurus.*

Leo. *Cancer.*

Libra. *Virgo.*

Sagittarius. *Scorpio.*

Aquarius. *Capricorn.*

Pisces.

The dominion of the Moon in man's body.

Aries.	The.	Head, and face.
Taurus.		Neck.
Gemini.		Arms, hands, shoulders.
Cancer.		Breast, stomach, ribs.
Leo.		Heart, back.
Virgo.		Bowels, belly.
Libra.		Reins*, navel, buttocks.
Scorpio.		Secret members.
Sagittarius.		Thighs.
Capricorn.		Knees.
Aquarius.		Shins, legs.
Pisces.		Feet.

FRom the change*, to the first quarter, a meet time to let young men's blood.

From the first quarter, to the full, good for middle age.

From the full, to the last quarter, apt for aged folk.

From the last quarter, to the change*, best for old men.

Signs meet for the complexions.

ARIES. *Sagittarius.* for the *phlegmatic*: the head, and thighs excepted.

Libra. *Aquarius.* for *melancholic*: buttocks, and legs excepted.

{*It is fitting for a skillfull doctor to observe these things diligently, and if not then worse dangers will come.*}

Cancer. *Scorpio* *Pisces.* for *choleric*: breast, members, and feet excepted.

For the *sanguine*, all be apt that before are named good.

In the *spring time* let blood at the right side.
In *Harvest time* at the left side.

The learned Physician will consider, besides all that is said, the *Conjunctions, Oppositions*, and *quadrate aspects* of the Planets: with many other things *Astronomical*, most necessary, both in bloodlet-

letting

letting, purging, bathing, &c.

For to take purgations, and to bathe,

THe meetest time to take purgations &c. is neither in hot, nor cold days: that is, from the tenth of March, to the twelfth of June.

Further, by rules Astronomical, it must be performed when the *Moon* is in cold, moist, and watery signs, as *Cancer, Scorpio* and *Pisces*: comforted by aspects, and radiations, of planets fortifying the virtue of the body expulsive.

Good to purge ♋, ♏, ♓.

The *Moon* in *Aries, Taurus*, and *Capricorn*, naught. One cause of vomiting the purgation, is the *Moon* having aspect to any planet *retrograde.*

Bad to purge. ♈, ♉, ♑.

The *Moon* in these signs following, very good to bathe: *Aries, Leo, Sagittarius, Cancer, Scorpio* & *Pisces*.

Good to bathe ♈, ♌, ♐, ♋. ♏. ♓.

These ensuing are evil to bathe: *Taurus*, *Virgo*, and *Capricorn*.

Bad to bathe. ♉, ♍, ♑.

Of inundations, or floods: of timber felling: sowing: planting: grafting: hair clipping: shaving: and gelding.

THe flood is biggest at the full: because then dispersing her virtue, she filleth all places with moisture. By common experience, joined with learning, I know, at the full the *Moon* loadeth all bodies with humors: and so are emptied, growing to the change*. Of this, some gather the fall of timber at the change*, more to the purpose than other times: wanting then superfluous moisture, the cause of putrefaction. {*All decay has its origin in humid moisture.*}[xxii] *Schoner* willeth from the. xv. day unto the. xxii. day of the *Moon*, trees to be felled, and that after *Midsummer* to *January*. So timber is strong, sound, and devoid of worms.

The fall of timber.

To *sow, Taurus, Cancer, Virgo, Libra*, and *Capricorn* are best, in the increase of the *Moon*.

To *Plant* or *Graft*, best is when the Moon hath her being in any fixed sign: either in *Taurus* or *Aquarius*, in the increase.

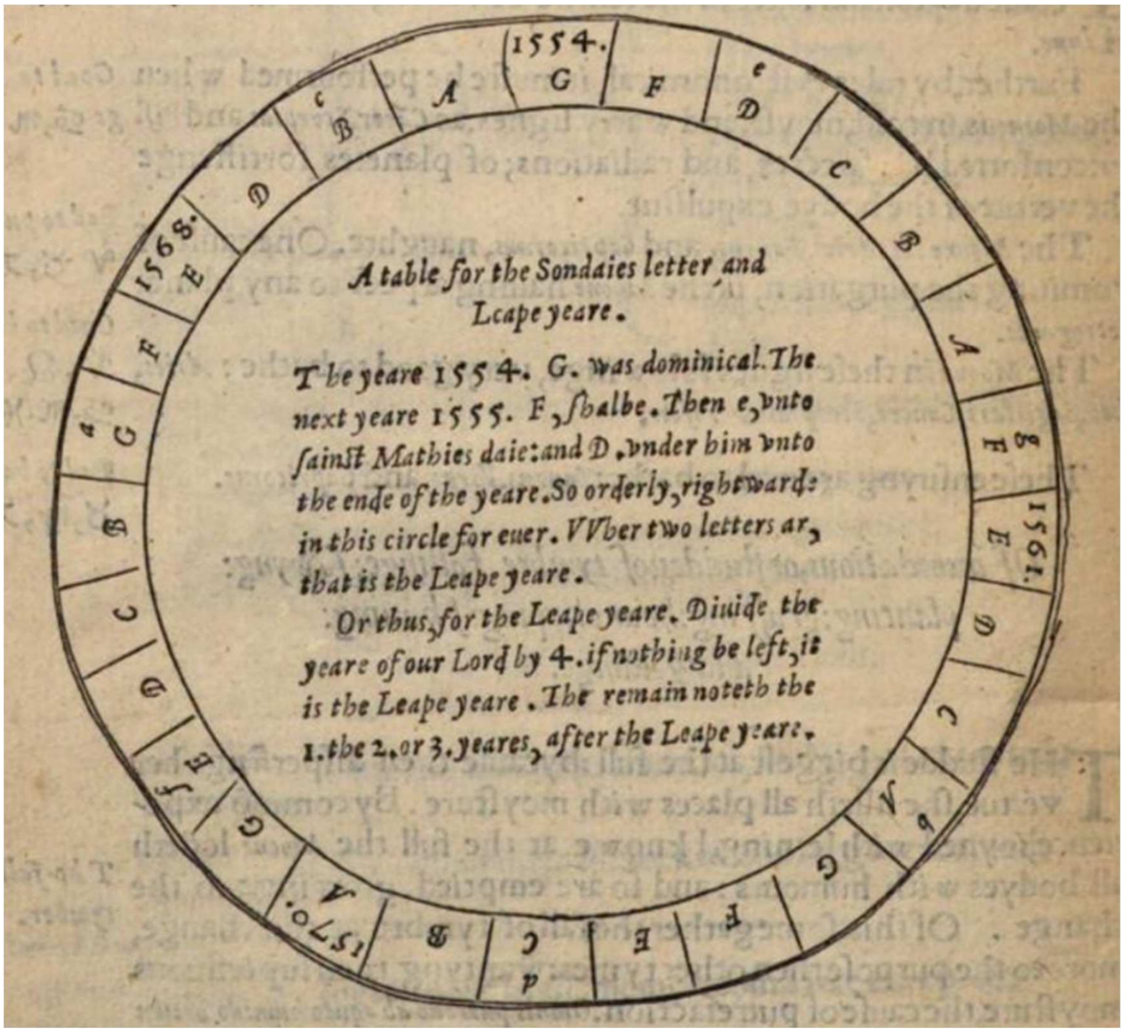
To plant or graft ♉, ♒.

To cut hair. ♉, ♍, ♎.

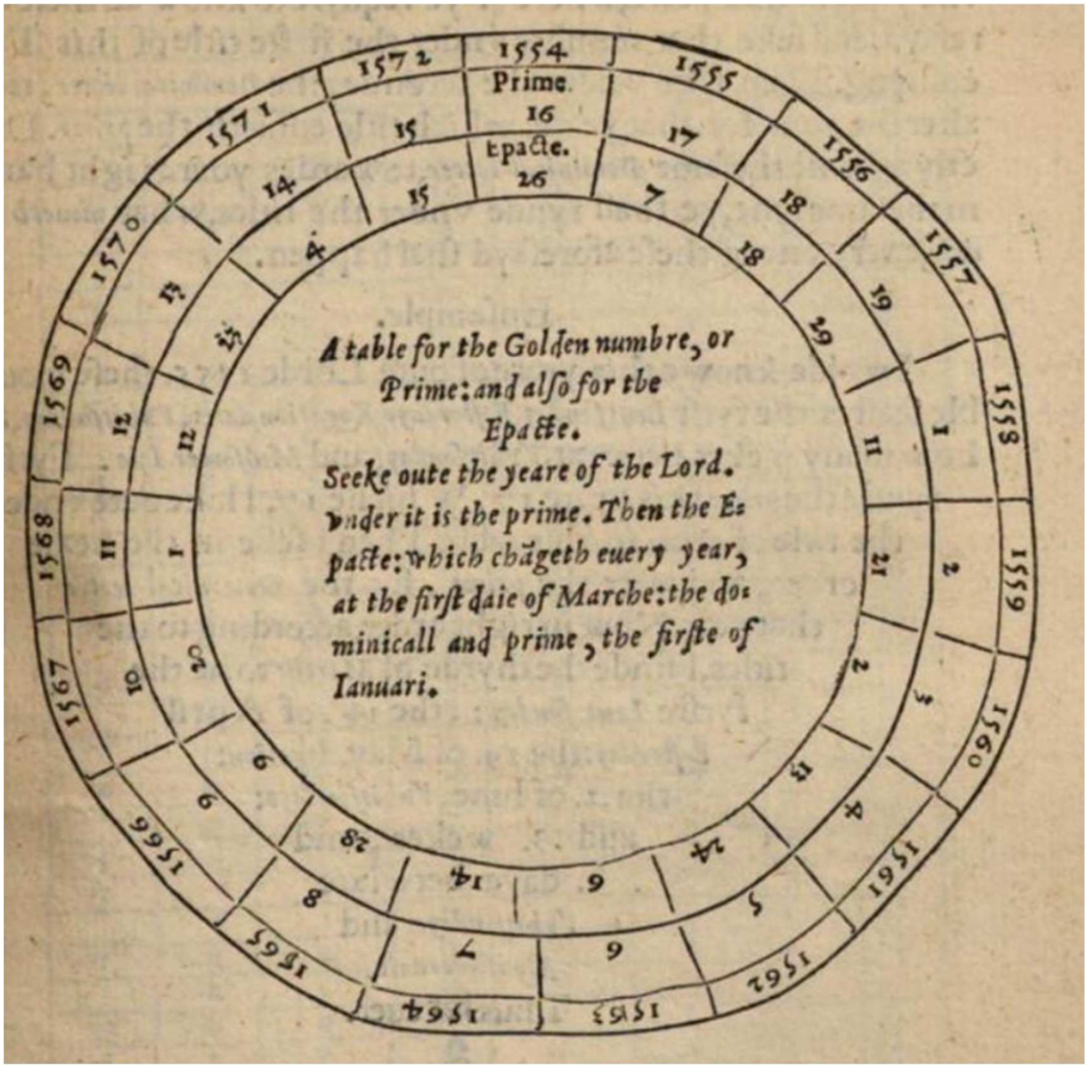
Hair cut groweth well, the *Moon* increasing, being in *Taurus*, *Virgo*, or *Libra*.
Cutting, shaving, clipping, in the wane, causeth baldness: what is then cut, groweth little. {*The oil of tartar prevents baldness*.}[xxiii]

Good to geld ♋, ♏, ♓.

The best time of *Gelding* is in *Cancer, Scorpio or Pisces*, in the wane.



This round Table above, and that also, which ensueth: conduce to the rest following.



Hereafter ensueth a table for the moveable feasts: whose use is thus briefly declared.

THe Table following, containeth in the first title the *Prime**: in the second, the *Dominical letter*: in the third, Lent: in the fourth, *Easter day*: in the fifth, *Rogation day*: in the sixth, *whitsunday*: in the seventh, how many weeks and days are between *whitsunday* and *Midsummer*. Which all appear by their titles.

The use is this.

You shall consider by the Table before put forth, what number the *prime** is that year, whereof you require to know all these afo-resaid: and seek that number under the first title of this Table ensuing. Then seek under the second, the *Dominical letter,* next after the *prime** for that year: which title ensueth the *prime**. Dire-ctly against the same *Dominical letter,* towards your right hand, in the same line, you shall find under the titles, what *month* and *day,* every one of these aforesaid shall happen.

Ensample.

I would know this year of our Lorde 1555. these movea-ble feasts: the first *Lent sunday, Easter day, Rogation days, Whitsunday,* and how many weeks betwixt *Whitsunday,* and *Midsummer day.* First I find the *prime** this year 17. Which 17, I look out under the title of *prime** in this table. Then I seek in the next order, and after the *prime*,* for the *Dominical letter* that year. Now in right order, according to the titles, I find the third of *Marche* to be the first *Lent sunday:,* the 14. of April *Easter day:* the 19. of May, *Rogation:* the .2. of June, *Whitsunday:* and .3. weeks, and 1. day betwixt *Whitsunday,* and *Midsummer day.* Thus for ever.

The prime.	*The sōdaies letter.*	*The first Lent son-daie.*	*Faster-daie.*	*Rogation*	*whitson-tide.*	*Betwixt whitson. ād midso.*	
16	D	*Februa.*	*March*	*April.*	*Maie.*	*wek.*	*dais*
	d	8	22	26	10	6	3
	e	9	23	27	11	6	2
13	f	10	24	28	12	6	1
2	g	11	25	29	13	6	0
	A	12	26	30	14	5	6
10	b	13	27	May.1.	15	5	5
	c	14	28	2	16	5	4
18	d	15	29	3	17	5	3
7	e	16	30	4	18	5	2
	f	17	31	5	19	5	1
15	g	18	April.1.	6	20	5	0
4	A	19	2	7	21	4	6
	b	20	3	8	22	4	5
12	c	21	4	9	23	4	4
1	d	22	5	10	24	4	3
	e	23	6	11	25	4	2
9	f	24	7	12	26	4	1
	g	25	8	13	27	4	0
17	A	26	9	14	28	3	6
6	b	27	10	15	29	3	5
	c	28	11	16	30	3	4
14	d	March.1.	12	17	31	3	3
13	e	2	13	18	June 1	3	2
	f	3	14	19	2	3	1
11	g	4	15	20	3	3	0
	A	5	16	21	4	2	6
19	b	6	17	22	5	2	5
8	c	7	18	23	6	2	4
	d	8	19	24	7	2	3
	e	9	20	25	8	2	2
	f	10	21	26	9	2	1
	g	11	22	27	10	2	0
	A	12	23	28	11	1	6
	b	13	24	29	12	1	5
	c	14	25	30	13	1	4

How to know the age of the Moon: then the change*, and quarter, forever.*

By the Prime* the Change* is known, but uncertainly: therefore here omitted.

First learn the *Epact*,* as I have instructed, for that year you seek to know the age of the *Moon*:* then reckon how many days is past of that month, which day you desire to know the age. Put that number to the *Epact*.* Then begin at *March,* and reckon for every month from them orderly one, until your said day, including both the month of *March,* and also the month of your said day. Add all these days, unto your former number: putting away as many *thirty days,* as you find. The rest, is the age of the *Moon*.* But *January* and *February* are counted from *March* backward, as above is said. The *age* found, the *change** is known. If you add 7. days to the *change*,* you have the *first quarter:* then 7. days, and somewhat more, showeth the *full:* and so to it adding 7. and more, bringeth the *last quarter:* thus by 7. unto the new *Moon.*

Now ensue two perfect Tables, declaring the true hour and minute of Ebbing and Flowing, in most coasts of England.

Of Ebbing and Flowing.

When you will know the *full sea,* seek out the name of the place, where you desire the *full water,* in the head of the Tables following: or learn the points of the compass there noted: or if you list*, know of some mariner, what *Moon* maketh a full sea there: a *Southwest,* or *South Moon* &c. Then the *age* of the *Moon** found under the place or point of the compass, showeth in right order, the hour, and minute of the *full water.* The *ebb* then is manifest. Example. I desire to know the full water at *London bridge,* the year of our Lord 1555. the 6. day of *February.* I find by rules before put forth, the 6. day of *February,* the year aforesaid, the *Moon* to be 14. days old. I see also under the title where *London* is S.W. which letters signify, that a Southwest *Moon* maketh a *full sea* there: and that is at 2. of the clock, and 12. minutes past. This is well perceived, if you run down in the Table, to the 14. day of the age of the *Moon*,* under *London* title. Behold the Tables.

Quinb. Southampton. Portsmoth.	Redban Aberdēe	Grauesende.	Dūdee. S. And.	Age of the Moon	London Tinmot Hertlepole.	Berwyke.	Frith. Lythe. Dūbar.	Falmot
South.	S b W.	S S W	S W b S		S W	S W b W	W S W	W b S.
H. M.	H. M.	H. M.	H. M.	☽	H. M	H. M	H. M.	H. M.
12 48	1 33	2 18	3 3	1	3 48	4 33	5 18	6 3
1 36	2 21	3 6	3 51	2	4 36	5 21	6 6	6 51
2 14	3 9	3 54	4 39	3	5 14	6 9	6 54	7 39
3 12	3 57	4 42	5 27	4	6 12	6 57	7 42	8 27
4 0	4 45	5 30	6 15	5	7 0	7 46	8 30	9 15
4 48	5 33	6 18	7 3	6	7 48	8 33	9 18	10 3
5 36	6 21	7 6	7 51	7	8 36	9 21	10 6	10 51
6 24	7 9	7 54	8 39	8	9 24	10 9	10 54	11 39
7 12	7 57	8 42	9 27	9	10 12	10 57	11 42	12 27
8 0	8 45	9 30	10 15	10	11 0	11 45	12 30	1 15
8 48	9 33	10 18	11 3	11	11 48	12 33	1 18	2 3
9 36	10 21	11 6	11 51	12	12 36	1 21	2 6	2 51
10 24	11 9	11 54	12 39	13	1 24	2 9	2 54	3 39
11 12	11 57	12 42	1 27	14	2 12	2 57	3 42	4 27
12 0	12 45	1 30	2 15	15	3 0	3 45	4 30	5 15
12 48	1 33	2 18	3 3	16	3 48	4 33	5 18	6 3
1 36	2 21	3 6	3 51	17	4 36	5 21	6 6	6 51
2 24	3 9	3 54	4 39	18	5 24	6 9	6 54	7 39
3 12	3 57	4 42	5 27	19	6 12	6 57	7 42	8 27
4 0	4 45	5 30	6 15	20	7 0	7 45	8 30	9 15
4 48	5 33	6 18	7 3	21	7 48	8 33	9 18	10 3
5 36	6 21	7 6	7 51	22	8 36	9 21	10 6	10 51
6 24	7 9	7 54	8 39	23	9 24	10 9	10 54	11 39
7 12	7 57	8 42	9 27	24	10 12	10 57	11 42	12 27
8 0	8 45	9 30	10 15	25	11 0	11 45	12 30	1 15
8 48	9 33	10 18	11 3	26	11 48	12 33	1 18	2 3
9 36	10 21	11 6	11 51	27	12 36	1 21	2 6	2 51
10 24	11 9	11 54	12 39	28	1 24	2 9	2 54	3 39
11 12	11 57	12 42	1 27	29	2 12	2 57	3 42	4 27
12 0	12 45	1 30	2 15	30	3 0	3 45	4 30	5 51
North.	N b E	N N E	N E b N	☽	N E	N E b E	E N E	E b N

For Lin Hūber weimot Dertm Plimot	*Bristo.*	*Milfo Bridg: water*	*Portl. Peter porte*	*Age of the Moon*	*Orkn Pole. Or: wel.*	*Diep. Lux. Le: noys*	*Boloig. Douer. Harwic Yarmot*	*Calice.*
East.	*EbS.*	*ESE.*	*SEbE*		*S E*	*SEbS*	*SSE*	*SbE*
H. M.	*H.M.*	*H.M.*	*H. M*	☽	*H.M*	*H. M*	*H. M.*	*H. M.*
6 48	7 33	8 18	9 3	1	9 48	10 33	11 8	12 3
7 36	8 21	9 6	9 51	2	10 36	11 21	12 9	12 51
8 24	9 9	9 54	10 39	3	11 24	12 9	12 54	1 39
9 12	9 57	10 42	11 27	4	12 12	12 57	1 42	2 27
10 0	10 45	11 30	12 15	5	1 0	1 42	2 30	3 15
10 48	11 33	12 18	1 3	6	1 48	2 33	3 18	4 3
11 36	12 21	1 6	1 51	7	2 36	3 21	4 6	4 51
12 24	1 9	1 54	2 39	8	3 24	4 9	4 54	5 39
1 12	1 57	2 42	3 27	9	4 12	4 57	5 42	6 27
2 0	2 45	3 30	4 15	10	5 0	5 45	6 30	7 15
2 48	3 33	4 18	5 3	11	5 48	6 33	7 18	8 3
3 36	4 21	5 6	5 51	12	6 36	7 21	8 6	8 51
4 24	5 9	5 54	6 39	13	7 24	8 9	8 54	9 39
5 12	5 57	6 42	7 27	14	8 12	8 57	9 42	10 27
6 0	6 45	7 30	8 15	15	9 0	9 45	10 30	11 15
6 48	7 33	8 18	9 3	16	9 48	10 33	11 18	12 3
7 36	8 21	9 6	9 51	17	10 36	11 21	12 6	12 51
8 24	9 9	9 54	10 39	18	11 24	12 9	12 54	1 39
9 12	9 57	10 42	11 27	19	12 12	12 57	1 42	2 27
10 0	10 45	11 30	12 15	20	1 0	1 45	2 30	3 15
10 48	11 33	12 18	1 3	21	1 48	2 33	3 18	4 3
11 36	12 21	1 6	1 51	22	2 36	3 21	4 6	4 51
12 24	1 9	1 54	2 39	23	3 24	4 9	4 54	5 39
1 12	1 57	2 42	3 27	24	4 12	4 57	5 42	6 27
2 0	2 45	3 30	4 15	25	5 0	5 45	6 30	7 15
2 48	3 33	4 18	5 3	26	5 48	6 33	7 18	8 3
3 36	4 21	5 6	5 51	27	6 36	7 21	8 6	8 51
4 24	5 9	5 54	6 39	28	7 24	8 9	8 54	9 39
5 12	5 57	6 42	7 27	29	8 12	8 57	9 42	10 27
6 0	6 45	7 30	8 15	30	9 0	9 45	10 30	11 15
VVest.	w b N	w N w	N w b w	☽	N w	N w b N	N w	N b w

To know how long the Moon shineth.

FOr her shining in the increase, multiply the age of the *[Mo]on* by 4. In the wane augment the rest of the age, which she la[ck] -eth of 30. by 4: and divide by 5. The *Quotient* showeth the h[ou-] res. The *Remainder*, if there be any, multiplied by 12. bringeth minu[tes] to be added.

Here followeth for the going down, and rising of the Moon: with her continuance on the earth.

NOte diligently after the change*, and before the full of the *Moon*, what hour the *Sun* goeth down: and add to that same so many hours and minutes, as the *Moon* shineth that night: for that hour and minute, she goeth down. Then hath she continued as long time on the earth, as the *Sun* would have done, being in that sign where she is. Therefore, her rising is known by subduction of that Arc. Note after the full, the *Moon* riseth so many hours before the *Sun*, as she shineth that night.

Now shall follow a Table, at all times plainly and briefly declaring, what day the Sun is entered the first degree of every sign. It showeth the break of the day: the hour, and minute of the Sun rising: the just length of the day: the length of the night also; the very minute of the Sun setting: and the Twilight.

Monethes	Dayes	Break of the day. H. M.	Sunne rysinge. H. M.	Lengthe of the day H. M.	Lēgthe of the night H. M.	Sunne settinge. H. M.	Twy-lyghte. H. M.	Dayes.	Monethes.	Minutes to be added to the length of the daye.
ber.	10	6 0	8 11	7 37	16 23	3 49	6 0	10	Dec.	1
	20	5 58	8 10	7 40	16 20	3 50	6 2	1		1
Ianu.	1	5 54	8 0	8 0	16 0	4 0	6 6	20	Nouē.	2
	10	5 44	7 49	8 22	15 39	4 11	6 16	10		7
	20	5 35	7 34	8 52	15 8	4 26	6 25	1		4
Febr.	1	5 15	7 12	9 35	14 25	4 48	6 45	20	Octo.	3
	10	5 0	6 55	10 9	13 51	5 5	7 0	10		7
	20	4 50	6 36	10 47	13 13	5 24	7 10	1		4
Mar.	1	4 20	6 18	11 23	12 37	5 42	7 40	20	Septe.	11
	10	4 0	6 1	11 58	12 2	5 59	8 0	10		16
	20	3 40	5 41	12 37	11 23	6 19	8 20	1		12
Apr.	1	3 8	5 18	13 14	10 36	6 42	8 52	20	Aug.	10
	10	2 40	5 1	13 57	10 3	6 59	9 20	10		15
	20	2 10	4 43	14 33	9 27	7 17	9 50	1		10
May.	1	1 30	4 25	15 9	8 51	7 35	10 30	20	Iul.	12
	10	0 30	4 12	15 35	8 25	7 48	11 30	10		12
	20	Cōtinuall day.	4 0	15 59	8 1	8 0	Day continuall.	1		7
Iu-	1		3 51	16 17	7 43	8 9		20	ne.	7
	10		3 48	16 23	7 37	8 12		10		
		H·M.	H.M.	H. M.	H. M.	H.M.	H M.			

The vse of this table.

Consider the moneth and daye, that ye require any of the to foresaide: and seke in this table that same, vnder the titles: procede in righte ordre: so ye haue your purpose. If the verye daye be not founde, take the nearest of your table. Or by proportiō the trueth is geuē: whiche all by Exāple folowing shal plainly be declared.

Example.

The first day of January, I desire all the aforesaid: that is, *the break of the day*: the very minute of the *Sun rising*: the *length of the day*, and also of the *night*: the *Sun going down*: and the *twilight*. I find on the right hand of *January*, these numbers running down, 1, 10, 20, which declare the first day, the tenth day, and twentieth, of that month. Now to my purpose, I require *the break of the day* &c. The first of *January*, in the Table, under that title, on the right hand of this figure 1. I see 5. hours, and 54. minutes, that is, 6. of the clock wanting 6. minutes. The *rising* of the *Sun* in that order, is just at 8. as this figure 8. there declareth, under that title, in the row. The *length of the day*, 8. hours: the *length of the night*, 16. hours: the *Sun setting* is at 4: the *twilight*, at 6. and 6. minutes. Even thus, for the tenth day, and also for the twentieth of that month, in the rows according to their titles, in the head of my Table.

The entry of the ☉ is before omitted, to avoid in the Table, confusion, and so much the rather, because it sufficiently appeareth, in the general Calendar following.

How to work by proportion, when the day is not found.

I Would know all the aforesaid, the first day of *January*. I take for example the *break of the day*. Remember the first day of *January*, I did find the *break*, to be at 5. of the clock, and 54 minutes: and the tenth day I may find, the *break of the day* to be at 5, and 44. minutes, that is, 10 minutes less. I see now 10. days do give me 10. minutes less. I say therefore (by *proportion*) the fifth day must give 5. minutes less then 5. hours 54. minutes: which is 5. hours, 49. minutes, my request. Thus for all the other titles.

To know the hour of the night, by the Moon: and that diversely.

THe hour of her rising known, as is opened, and a mark made for it, in any true fixed, or movable *Sun Dial*, the hours

How by the Moon, the

night hour is found.

and minutes from that mark all the night after, are to be added to her rising. If more than 12. surmount, only that above 12. showeth the true hour and minute. If at the rising she maybe not be seen, then by the *Sun* rising, in that very sign (with the help of this *Almanac*) you may perceive what hour she would note at her rising. Therefore from that mark count.

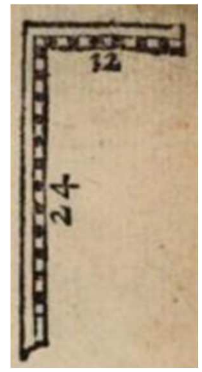
Another way.

WHen the *Moon* is at the full, look what hour her shadow showeth in any *Dial*, that is the hour of the night. After she be past the full 28. hours, ye must add one hour: but afore the full, pull one from that you find in the *Dial*. If twice 28, two hours &c. So have you the hour of the night.

How the hour of the day, by right shadow, that is by anything directly standing up, is known: and by square shadow also.

FIrst it behooveth you to have a staff, or any other thing, divided in twelve equal parts: and each portion in 6. other: so are those last parts 10. minutes apiece. When you list* to have the hour, set up directly your divided staff, on a plane level ground, or board &c. Note the just length of that shadow, what parts and minutes it containeth. With those, enter your month in the peculiar *Calendar* following: beholding diligently under the name of that month, the small enclosed Tables: considering well, which of those small Tables are nearest unto your day: and that judge by the sign, or day there noted. That table serveth your purpose: where you must look out the parts and minutes of the shadow afore found, or near unto it: under or over the which the hour is set, before, or after noon. Note that two pricks there signify half a part more than is noted: one prick, half a part less. Here it is also to be noted, that every Table hath within, two rows of figures: the upper is for the staff: the other for the square shadow And whatsoever is before said of the one, that same is meant here of the other, saving of the *composition*. For the square must be divided

from



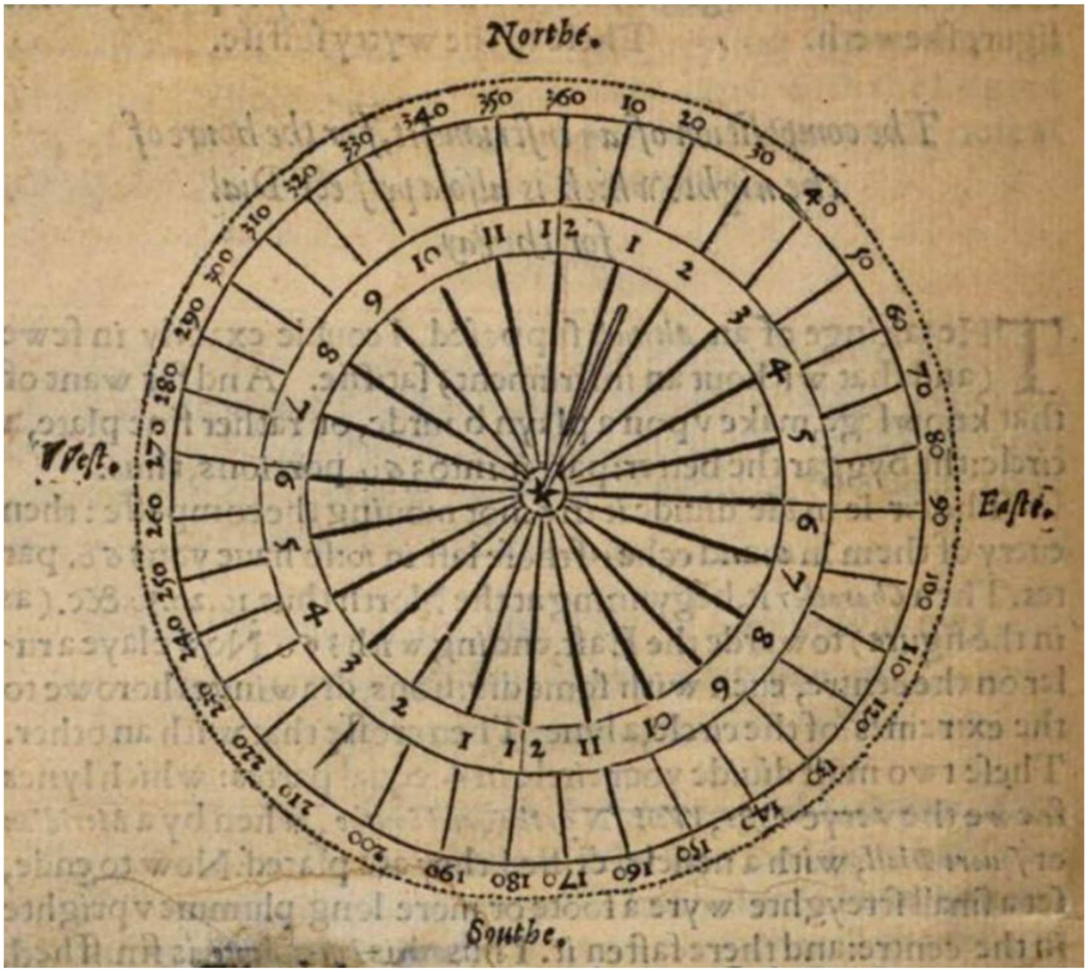
from the inward angle, to the end of one side, in 12. equal parts: even so from that angle, the other side into 24. like parts, as this figure showeth. These to the witty suffice.

The composition of an instrument, for the hour of the night: which is also a perfect Dial for the day.

THe taking of an *Altitude* supposed, I could exactly in few (and that without an instrument) satisfy. And for want of that knowledge, make upon a plain board, or rather fine plate, a circle: the bigger the better: part it into 360. portions, thus.

The circle made, divide it in 6. not moving the compass: then every of them in 6: and each of those last in 10: so have you 360. parts. Then *Character* it, beginning at the North thus, 10. 20. 30. &c. (as in the figure) toward the East, ending with 360. Now lay a ruler on the center, even with some divisions, drawing through to the extremes of the circle, a line. Then cross that with another. These two must divide your circle in 4. equal parts: which lines show the very *East, West, North, and South,* when by a *Meridian* or *square Dial*, with a needle rectified, they are placed. Now to end, set a small straight wire, a foot or more long, plumb upright in the center: and there fasten it. Thus this *instrument* is finished, to be fixed about your house, *equidistant* or level with the *Horizon*: having a needle, if you list*, in it, truly to plage* it, when and where you will. That it may be also a *Dial*, you must pull straight lines from the center, to every fifteenth part: decking them with *Characters* in the inward margin, conveniently as you see the figure. Thus when the Sun shineth, the shadow of the wire, showeth the true hour &c. being truly plaged*, well placed, and reared*, as followeth.

❧ *A perfect instrument for the day, and the night.*



The right rearing, and placing, of the Dial before mentioned.*

LIft up handsomely, your instrument or *Dial*, toward t[he] North, in some meet place, the side of a square lying on it, until the plummet and line, centered in the extreme upper part of the other side of your square like long, cut all that square side, which lieth on your instrument, the fifth part only except. Then move your instrument, hither and thither, this or that way, until the shadow of the wire fall upon the hour of the day, keeping diligently your height before. Your *Dial* thus fixed declareth, all the year long, the exact hour and parts thereof.
No *Dial* in truth excelleth this. Have in remembrance, that this instrument must lie level, nothing at all reared*, for the hour of the night by star.

To get

To get the exact hour by two stars of the first light, with an instrument or circle, before divided, first of me invented, calculated and practiced.

THe instrument, equidistantly set and plaged*, as is declared in the composition, ye ought to lay the edge of a ruler unto the wire, the other nether end touching the instrument, moving here and there, still touching the wire, until either *Star* doth offer itself with that edge, and that by the judgment of the eye. Then put down discretely your ruler (ever touching the wire) the hinder end not moved, observing how many parts are cut from the *North*, to the edge of the ruler. Enter with them the pe culiar *Calendar* following: seeking out your *month*, placed in the midst of every Table: then the day of that month must be there found.

The way to find the hour of the night.

Note that, every table hath on the sides, the days thus ordered 1. 5. 10. 15. 20. 25. 30. Know, that order or row of figures, which is right against, or nearest your day, serveth the turn. The number or parts before cut by the *Ruler*, and now found in that row of your table, showeth the precise hour. If it be too little, that hour over the head or under is not yet come: if contrary, it is past.

How these two bright stars, being of the first light are found: the one called Aldebaran: the other Alramech.[xxiv]

THe best way is thus: The *month* and *day* known, with the true *hour* of the *night*, enter your Table, considering that *month* and *day*: observe what parts belong there to that *Star* and *hour*. Then resort to your instrument, laying the edge of your ruler, as many parts from the *North*, *Eastward*, circumspectly lifting up that edge, close by the wire: so the fair *Star* shineth even with that edge.

By what means these stars are known.

Or thus grossly.

A*ldebaran* is ever a meet rod, and more to the eye under the 7. *Stars*, and somewhat *North* of them, in the rising. *Alramech* is contrary to him plaged*, accompanied with a little dim *Star*, an ell* from him, by the judgment of the sight.

Another way to find them

G

Now followeth a brief, pleasant, necessary, general Calendar: divided in two parts. Whereof the first containeth six months, from January to June: the second table the other six months, from July to December. In this Calendar are set forth the Festival days: the entering of the Sun into the Signs celestial: the evil Days within every month &c.

(*)

NOte here, that the evil days in each month are all marked with a Colon, that is a double or twopricked point: some, that be more meanly evil, are marked with one full point, set afore them.

NOte also: that some *Terms* ensuing moveable *Feasts*, are moveable, and so could have no certain place in the *Calendar*, for their beginning and ending. Know therefore, that *Easter Term* always beginneth the 13. day after *Easter*, reckoning *Easter* day for one; and endeth the *Monday* next after the *Ascension day*.

Trinity Term beginneth the *Friday* next after *Corpus Christi day*: and endeth the *Wednesday* fortnight after.

Michaelmas Term beginneth the 9. or 10. day of *October*: and endeth the 28. or 29. of *November*.

Hilary Term beginneth the 23. or 24. day of *January*: and endeth the 12. or 13. day of *February*.

The first part of the generall Kalendar: from Ianuarie to Iune.

Ianuarie.	Februarie	March.	Dayes	April.	May.	Iune.
:A Circũc.	d	d	1	g	b Ph.Iac.	e
:b	e Purifi.	e	2	A	c	f
c	f	f	3	b	.d	g
:d	g	g	4	c	e	:A
:e	A	A	5	d	f	b
f Epiph.	b	b	6	e	.g	c
g	c	c	7	.f	:A	:d
A	:d	d.	8	.g	b	e
b	e ☉ in ♓	e	9	A	c	f
:c ☉ in ♒	:f	f	10	.b	d	.g
d	g	g ☉ in ♈	11	c ☉ in ♉	e	A Barna.
e	A	A	12	d	f ☉ in ♊	b ☉ in ♋
f Hilar.	b	b	13	e	g	c
g	c Valent.	c	14	f	A	d
:A	d	:d	15	g	:b	.e
b	e	:e	16	:A	c	f
:c	:f	f	17	b	d	g
d	g	g	18	c	e	A
e	A	:A	19	d	f	b
f	b	b	20	.e	:g	c
g	c	c	21	:f	A	d
A	d	d	22	g	b	.e
b	e	e	23	A Georg.	c	f
c	f Mat.	f	24	b	d	g Ioã bap.
d Cõ.Pau.	g	g Annun.	25	c Marc.	e	A
e	.A	A	26	d	f	b
f	.b	b	27	e	g	c
g	.c	.c	28	f	A	d
:A		d	29	g	b.	e Pe.Pa.
b		e	30	A	c	f
c		f	31		d	

The seconde parte of the general Kalendar: from Iulie to December.

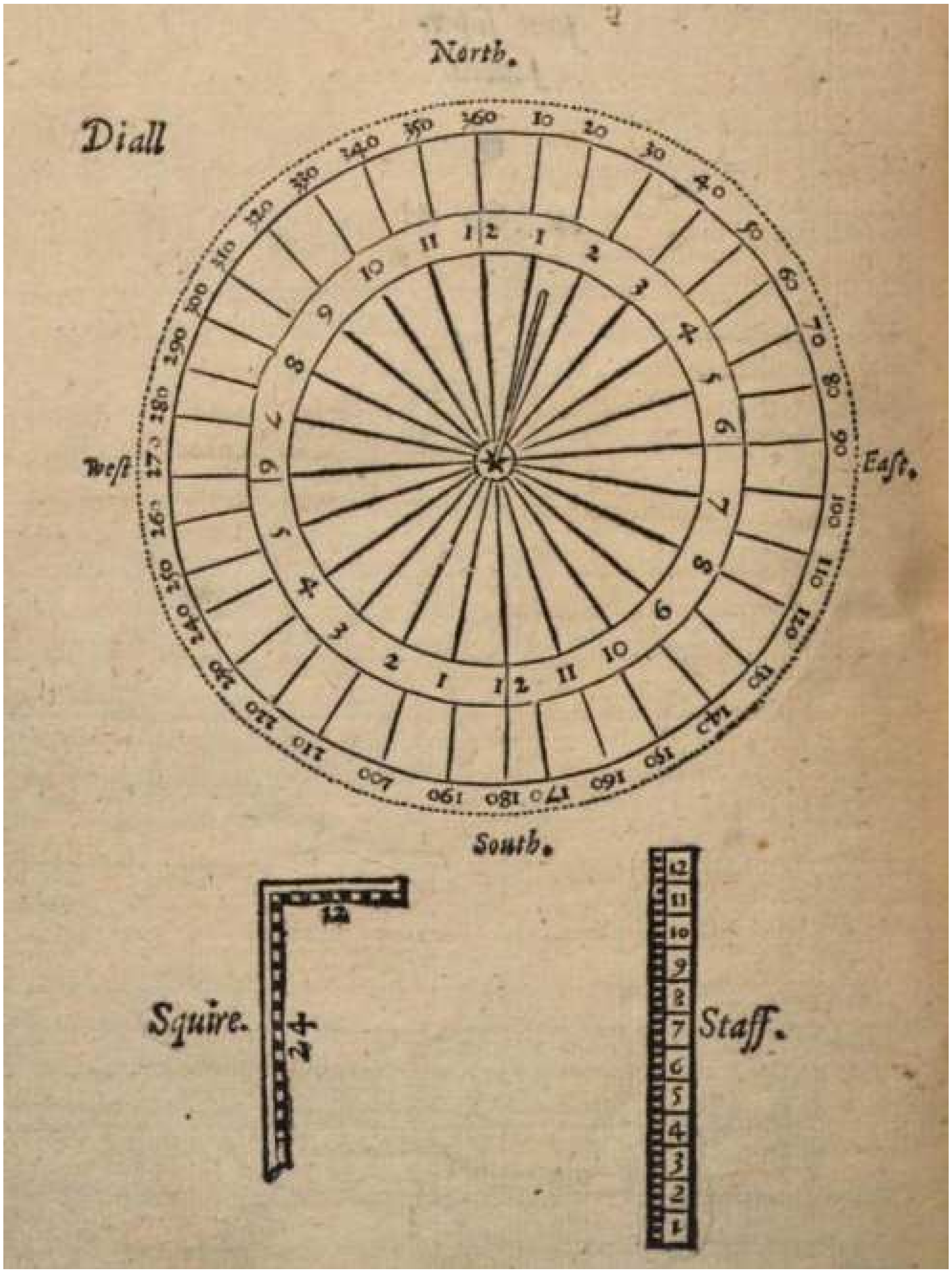
Iulie.	August.	Septem.	Days	October.	Nouem.	Decem.
g	.c Pet. vin.	f	1	A	d Om. sa.	f
A	d	g	2	b	e Om. ani.	g
b	e	.A	3	.c	f	A
c	f	.b	4	d	g	b
d	g	c	5	e	.A	c
e Dog beg.	A	:d	6	:f	.b	:d Nicol.
f	b	:e	7	g	c	:e
g	c	f Nat. ma.	8	A	d	f Conce. ma.
A	d	g	9	b	e	:g
b	e	A	10	c	f	A
c	f	b	11	d	g	b
d	g	c	12	e	A	c ☉ in ♑
e	A	d	13	f	b ☉ in ♐	d
f ☉ in ♌	b ☉ in ♍	c ☉ in ♎	14	g ☉ in ♏	c	e
:g	c	f	15	A	:d	.f
A	d	g	16	.b	e	g
b	e Dog end	A	17	c	f	.A
c	f	b	18	d Luc.	g	b
d	:g	c	19	e	:A	c
:e	:A	d	20	f	b	d
f	b	.e Mathe.	21	g	c	e Tho. ap.
g Ma. meg	c	.f	22	A	d	.f
A	d	g	23	b	e	g
b	e Bartho.	A	24	.c	f	A
c Iac. apo.	f	b	25	d	g	b Nat. do.
d	g	c	26	e	A	c Steph.
e	A	d	27	f	b	d Io. eua.
f	b	e	28	g Si. Iud.	.c	e Innocen.
g	:c decol. Io.	f Micha.	29	A	.d	f T.
A	.d	g	30	b	e Andr.	g
b	e		31	c		A

NOw ensueth the needful, necessary, peculiar Calendar tofore mentioned: with Instruments belonging thereto. The composition, and appliance of the said Tables, with the pleasant use of them, are before sufficiently, opened: therefore farther declaration here, might seem superfluous.

❧

❧ (*) ❧

Necessary instruments, to find exactly the hour
of the day and night, diverse
ways, with help of
this peculiar
Calen-
dar.



From euening to midnight.

	5	6	7	8	9	10	11	12
1	108	123	142	165	190	214	60	71
5	112	128	148	172	198	220	63	75
10	117	135	157	182	207	228	67	78
15	123	142	165	192	214	234	71	81
20	129	150	175	200	222	240	75	86
25	136	158	183	208	229	244	79	90
30	142	166	192	215	234	249	82	94

Ianuary hath. xxxi. dayes.

From midnight vnto day.

	1	2	3	4	5	6	7	8
1	82	94	106	121	142	168	198	
5	86	97	111	127	149	177	206	
10	89	101	116	134	157	187	214	
15	93	105	122	141	168	198	223	
20	98	111	128	150	179	207	231	
23	102	117	135	159	189	216	237	
30	106	122	143	169	299	223	243	

day 10

H	12	11	10	9	8	7	
Staffe	36:	39	49:	83	550	0	shad.
Squir.	4	3:	3.	2.	0	0	shad.
H	0	1	2	3	4	5	

0 gr

day 19

H	12	11	10	9	8	7	
Staffe	32.	34	42	65:	209	0	shad.
Squire	4:	4	3	2	1.	0	shad.
H	0	1	2	3	4	5	

10 gr

day 29

H	12	11	10	9	8	7	
Staffe	27:	29:	35:	52	119	0	shad.
Squire	5	5.	4	3.	1	0	shad.
H	0	1	2	3	4	5	

25 gr

From euening to midnight.

	6	7	8	9	10	11	12	
1	169	195	218	62	73	83	95	
5	176	201	223	64	75	86	99	
10	185	209	230	69	79	90	103	
15	192	215	235	71	82	94	107	
20	200	222	240	75	86	98	112	
25	207	228	244	78	89	102	117	
30								

February hath. xxviii. dayes.

From midnight vnto day.

1	2	3	4	5	6			
103	124	146	174	203	226			1
112	129	152	180	209	231			5
117	135	161	190	216	238			10
122	143	168	198	224	243			15
128	150	180	207	231	248			20
134	158	188	214	236	252			25
								30

day 8 — 0 gr ♓

H	12	11	10	9	8	7	
Staffe	23:	25	30	42	80.	6896	shad.
Squire	6	6.	5.	3:	2·	0	shad.
H	0	1	2	3	4	5	

day 18 — 10 gr ♓

H	12	11	10	9	8	7	
Staffe	20	21:	25:	34:	61:	226	shad.
Squire	7	7.	6.	4	2	1.	shad.
	0	1	2	3	4	5	

day 28 — 20 gr ♓

H	12	11	10	9	8	7	
Staffe	17:	18:	22.	29.	45	112	shad.
Squire	8	8.	6:	5	3	1	shad.
H	0	1	2	3	4	5	

From euening to midnight.

	7	8	9	10	11	12		
1	59	70	81	93	105	120		
5	62	72	83	95	108	124		
10	65	76	87	99	113	130		
15	69	80	90	103	118	136		
20	72	82	94	107	123	144		
25	75	86	98	112	128	150		
30	79	90	101	117	134	159		

Marche hath.xxxi.dayes.

From midnight vnto day.

	1	2	3	4	5	6		
1	139	166	196	220	240			
5	145	173	203	225	244			
10	153	182	210	232	249			
15	162	191	217	238	254			
20	171	200	225	243	258			
25	178	208	231	248	262			
30	188	215	237	253	266			

day

10	H	12	11	10	9	8	7		H
	Staffe	15	16	19.	24:	37.	73:		ſhad.
	Squire	9:	9	8.	6	4	2		ſhad.
	H	0	1	2	3	4	5		

20	H	12	11	10	9	8	7	6	H
	Staffe	13	14.	16.	21	30:	54:	221	ſhad.
	Squire	11	10	9.	7.	5.	2:	1.	ſhad.
	H	0	1	2	3	4	5	6	

10 gr ♈

31	H	12	11	10	9	8	7	6	H
	Staffe	11:	12	14:	18:	26	43	112.	ſhad.
	Squire	12:	12.	10	8.	5:	3	1	ſhad.
	H	0	1	2	3	4	5	6	

20

From euening to midnight.

	8	9	10	11	12			
1	92	104	118	136	162			
5	94	106	122	143	170			
10	98	111	127	150	178			
15	101	116	134	158	188			
20	105	122	141	168	198			
25	111	126	149	177	206			
30	116	133	157	186	214			

Aprile hath.xxx.dayes.

From midnight vnto day.

1	2	3	4	5				
191	218	238	254					1
199	224	243	257					5
208	230	247	261					10
214	236	252	265					15
223	242	256	269					20
229	247	261	273					25
236	251	265	276					30

day 10

H	12	11	10	9	8	7	6	
Staffe	10	12.	13.	16:	23	36	76	shad.
Squire	14	13	11	9.	6	4	2	shad.
H	0	1	2	3	4	5	6	

day 20

H	12	11	10	9	8	7	6		
Staffe	9	9.	11	15.	22.	31:	58	267:	shad.
Squire	16	15	12:	9	7	4	2:	1.	shad.
H	0	1	2	3	4	5	6	7	

10 gr ♉

day 21

H	12	11	10	9	8	7	6	5	
Staffe	8	8:	10:	14.	19	28	49.	139:	shad.
Squire	18	17.	14.	10:	7	5	3	1	shad.
H	0	1	2	3	4	5	6	7	

20

From euening to midnight.

	8	9	10	11	12			
1	117	134	159	189	216			
5	120	140	165	195	220			
10	126	148	176	205	228			
15	133	156	186	213	235			
20	140	166	195	221	240			
25	148	175	205	229	246			
30	157	186	214	235	251			

May hath.xxxi.dayes.

From midnight vnto daye.

1	2	3	4	5				
237	252	266	278					1
240	255	268	279					5
246	260	273	284					10
251	264	276	287					15
256	268	280	291					20
260	272	284	294					25
264	276	287	298					30

day 11

H	12	11	10	9	8	7	6	5	
Staffe	7	8	10.	13.	17:	26.	42.	1:0	shad.
Squire	20.	18	15.	11	8	5:	3	1:	shad.
H	0	1	2	3	4	5	9	7	

0

day 21

H	12	11	10	9	8	7	6	5	4	
Staffe	7.	7:	9	12	17:	24	39	82	2580	shad.
Squire	21	19.	15.	12.	8:	6.	4.	2.		shad.
H	0	1	2	3	4	5	6	7	8	

10 gr ♊

day 32

H	12	11	10	9	8	7	9	5	4	
Staffe	6:	7	9	12	16:	23:	37:	74:	565	shad.
Squire	22	20	16	12	9.	6	4	2		shad.
H	0	1	2	3	4	5	6	7	8	

20

From euening to midnight.

	8	9	10	11	12			
1	161	191	217	238	253			
5	169	200	225	243	258			
10	180	209	231	248	262			
15	190	216	237	253	266			
20	210	225	243	258	270			
25	209	232	249	262	274			
30	217	238	253	267	278			

Iune hath.xxx.dayes.

From midnight vnto daye.

	1	2	3	4	5			
1	257	278	289	300				
5	270	280	292	303				
10	274	285	296	307	&c.			
15	278	288	299					
20	281	292	303					
25	285	296	308					
30	289	300	82					

day 1 — 20gr. ♊

	12	11	10	9	8	7	6	5	4	
										H
Staffe	6:	7	9	12	16:	23	36	74	565	*shad.*
Squire	22	20	16	12	9	6	4	2.		*shad.*
H	0	1	2	3	4	5	6	7	8	

day 12 — 0 — 8gr ♋

	12	11	10	9	8	7	6	5	4	
										H
Staffe	6.	7	9:	12.	16	23	36	72	45	*shad.*
Squire	22:	20:	16	12	9	6:	4	2	0	*shad.*
H	0	1	2	3	4	5	6	7	8	

day 22 — 10

	12	11	10	9	8	7	9	5	4	
										H
Staffe	6:	7	9	12	16	232	37	74	565	*shad.*
Squire	22	20	16	12	9	6	4	2.		*shad.*
H	0	1	2	3	4	5	6	7	8	

	8	9	10	11	12			
1	218	229	254	267	278			From turning to midnight.
5	226	243	258	270	281			
10	231	249	262	274	283			
15	238	253	267	278	289			
20	243	258	270	282	292			
25	249	262	274	285	296			
30	253	266	277	288	299			

Iuly hath.xxxi.dayes.

From midnight unto day.	290	300	82					1
	292	308	86					5
	296	78	89					10
	300	82	93					15
	303	85	97					20
	307	89	100					25
	81	93	105					30
	1	2	3	4	5			

day

3	12	11	10	9	8	7	6	5	4		
Staffe	7.	7:	9	11:	16:	14	19:	82:	258	ſhad.	10 gr ♋
Squire	21	19:	15:	12	8:	6	4	2.		ſhad.	
H	0	1	2	3	4	5	6	7	8		

14	12	11	10	9	8	7	6	5 H		
Staffe	7	8	10.	13·	17:	26.	43.	10:	ſhad.	0
Squire	20.	18	16.	11	8	5:	3	1:	ſhad.	gr. ♌
H	0	1	2	3	4	5	6	7		

24	12	11	10	9	8	7	6	5 H		
Staffe	8	8:	10:	14.	19	28	49.	139:	ſhad.	10
Squire	18	17.	14.	10.	7:	5	3	1	ſhady	
H	0	1	2	3	4	5	6	7		

From euening to midnight.

	8	9	10	11	12		
1	255	267	279	290	301		
5	259	271	281	292	304		
10	262	274	285	297	78		
15	266	277	288	299	81		
20	269	280	291	303	85		
25	272	284	295	305	88		
30	278	287	298	80	92		

August hath.xxxi.dayes.

From midnight vnto day.

	1	2	3	4	5		
1	83	94	106	121	138		
5	86	97	111	125	144		
10	89	101	115	131	151		
15	93	105	119	136	158		
20	96	109	124	142	165		
25	99	113	129	148	173		
30	104	118	135	156	181		

day 3 — 20 gr ♌

	12	11	10	9	8	7	6	5	
Staffe	9	9:	11:	15	21	32	58:	267	shad.
Squire	16	15	12:	9:	7	4:	2:	0	shad.
H	0	1	2	3	4	5	6	7	

day 14

H	12	11	10	9	8	7	6	
Staffe	10	12.	13.	16:	23	36	76	shad.
Squire	14	13:	11	9.	6	4	2	shad.
H	0	1	2	3	4	5	6	

day 24 — 10 gr. ♍

H	12	11	10	9	8	7	6	
Staffe	11:	12	14:	18:	26	43:	111:	shad.
Squire	13:	12	10.	8.	5:	3	1	shad.
H	0	1	2	3	4	5	6	

From euening to midnight.

	7	8	9	10	11	12
1	266	278	289	299	82	93
5	269	280	291	303	84	96
10	273	284	294	306	88	100
15	276	286	298	80	92	104
20	279	290	302	83	94	107
25	283	294	305	87	99	114
30	287	297	79	90	102	117

September hath. xxx. dayes.

From midnight vnto day.

1	2	3	4	5	6	
105	119	136	159	184		1
109	123	142	165	191		5
113	129	149	173	199		10
117	135	155	180	205		15
122	140	163	189	212		20
128	147	171	197	219		25
131	153	179	204	225		30

day 3 — 20 gr. ♍

H	12	11	10	9	8	7	6	
Staffe	13	14.	16:	21	30:	54:	221:	ſhad.
Squire	11	10	9.	7.	5.	3:		ſhad.
H	0	1	2	3	4	5	6	

day 13 — 0 gr ♎

H	12	11	10	9	8	7	
Staffe	15	16	19.	24:	37.	73:	ſhad.
Squire	9:	9	8.	6	4	2	ſhad.
H	0	1	2	3	4	5	

day 23 — 10 gr ♎

H	12	11	10	9	8	7	
Staffe	17:	18:	22.	29.	45:	112	ſhad.
Squire	8	8.	6:	5	3	1	ſhad.
H	0	1	2	3	4	5	

From euening to midnight.

	6	7	8	9	10	11	12	
1	276	287	298	80	91	103	117	
5	279	290	301	82	94	106	121	
10	283	293	304	86	98	111	126	
15	285	67	78	89	102	115	132	
20	289	70	81	93	106	120	138	
25	292	74	85	97	111	125	145	
30	296	78	88	101	115	131	151	

October hath.xxxi.dayes.

From midnight vnto daye.

	1	2	3	4	5	6	7	
1	133	155	180	205	227	243		
5	138	161	186	211	231	247		
10	146	169	195	218	236	251		
15	152	177	202	224	242	256		
20	159	185	210	230	246	260		
25	168	193	216	235	250	263		
30	176	201	223	241	255	267		

day 3 — 20gr. ♎

H	12	11	10	9	8	7		
Staffe	10	22	25:	34:	61:	116		shad.
Squire	7	7.	6.	4	2	0		shad.
H	0	1	2	3	4	5		

day 13 — 0 gr ♏

H	12	11	10	9	8	7		
Staffe	23:	25	30	42	73:	6896		shad.
Squire	6:	6.	5.	3	2.			shad.
H	0	1	2	3	4	5		

day 23 — 10 gr ♏

H	12	11	10	9	8			
Staffe	27:	29	35:	52	119			shad.
Squire	5	5.	4	3	2			shad.
H	0	1	2	3	4			

	5	6	7	8	9	10	11	12
1	289	297	80	90	103	117	134	155
5	290	301	82	94	106	121	138	162
10	293	305	87	98	111	126	146	169
15	297	79	90	102	117	133	154	180
20	301	83	94	107	122	137	163	188
25	305	87	99	113	128	147	173	198
30	80	91	104	118	134	156	180	207

From euening to midnight.

Nouember hath. xxx. dayes.

From midnight vnto day.

1	2	3	4	5	6	7	8	
180	205	226	243	257	269	280	292	1
186	211	231	247	260	272	284	295	5
196	218	237	252	264	276	287	000	10
204	225	243	256	268	280	291	000	15
212	232	248	261	273	284	295	000	20
220	138	253	266	277	288	127	000	25
228	244	258	269	280	292	132	000	30

day

2	12	11	10	9	8			H
Staffe	32	34	42	65:	109			shad.
Squire	4:	4	3	2	1.			shad.
H	0	1	2	3	4			

20 gr. ♏

12	12	11	10	9	8		H
Staffe	36	39	49:	83	550		shad.
Squire	4	4	3	2.			shad.
H	0	1	2	3	4		

0

gr ♐

22	12	11	10	9			H
Staffe	40:	45	57	104.			shad.
Squire	3:	3	2:	2:			shad.
H	0	1	2	3			

10

From euening to midnight.

	5	6	7	8	9	10	11	12
1	81	92	105	119	135	156	183	208
5	84	96	109	123	143	165	192	215
10	88	100	114	130	150	175	201	223
15	93	105	120	135	159	185	210	230
20	98	111	126	145	168	195	218	236
25	102	116	132	153	177	203	225	242
30	106	121	138	162	186	211	231	247

December hath.xxxi.dayes.

From midnight vnto day.

	1	2	3	4	5	6	7	
1	229	245	258	271	282	292	135	*
5	234	249	263	274	286	123	143	
10	240	255	267	278	288	129	150	
15	246	260	271	283	293	137	162	
20	251	264	275	286	124	146	174	
25	256	268	279	291	131	153	183	
30	261	272	284	295	138	165	195	

day		12	11	10	9				H	
2	Staffe	43:	47:	62:	122:				shad.	20 gr. 23
	Squire	3	3	2	1				shad.	
11	Staffe	45.	49.	65.	132.				shad.	0
	Squire	3	3	2	1				shad.	
21	Staffe	43:	47:	62:	122:				shad.	10 gr. 20
	Squire	3:	3	2:	12				shad.	
31	Staffe	40:	45:	57	104	6			shad.	20
	Squire	3:	3	2:	1				shad.	
H		0	1	2	3					

Conjectural emendations

Following is a list of the modifications this edition has made in places where the copy-text is unclear. These have been set off in the edition with [brackets]. This list is organized by the page number of the modification.

Page 2:

The numerals that precede items 6 and 7 seem to have been omitted or erased. In the copy-text, a 6 appears to have been written faintly in line with the other numbers. There is no visible sign of a 7. In item 7, the portion of the word "conteyninge" that appears at the left margin looks as though it bears signs of partial erasure consistent with the numeral 7 having been erased just above it. Why the 6 and 7 here would have been erased is difficult to fathom.

Originally "Geidlng," presumed to be a misprint.

Page 3:

"Right shadow" and "shadow Geometrical" are partially cut off. The page has crumbled here and been repaired.

Page 5:

Originally "I wiss he". I am treating the "h" as a misprint for "b". The expression "I wiss" could, of course, represent *ywis* (certainly), but this modification would do nothing to clarify the intended sense.

Page 17:

From the word "tempest" to the bottom of the page there is a tear in the leaf that appears to have been mended. This tear misaligns the text on either side on this page, as reflected in the bracketed emendations running down the page, making the text to the reader's right appear half a line lower than that on the left. While this tear is visible on the recto of the leaf (the previous page), its effect on the text there is minimal, suggesting that perhaps the person who repaired the tear may have done so while looking at the recto.

Page 26:

In the margin, Poland is originally "Pole." OED s.v. "Pole, n.3" under Etymology states, "Recorded earlier as the name of the country Poland (now archaic in this sense, rare after the 17th cent.)"

Page 30:

On the left side of the page there is damage resembling a burn that obliterates several words. it appears on the verso of the leaf, as well, but the damage is less severe.

Page 31

The damage on the recto of the leaf appears here also, but less severely.

Page 42

Along the right margin, several words look to have been excised, or perhaps an imperfection in the paper prevented the ink from properly adhering.

Textual notes

This section is reserved for notes dealing with the text itself. Such notes are marked in the edition with a dagger (†), and correspond to their page number here.

Page 2:

before: Originally "tofore"

hairclipping: Originally "hearclipping." The OED, in the Etymology section for *hair*, lists "hear" as an anomalous spelling.

Page 5:

Panauges: Digges died before he could write *Panauges*.

Page 7:

demonstration: The original Latin word here is *demonstrationem*, which, in this context, refers to syllogism.

Page 11:

perch: Originally spelled p̱che, but with a macron over the p̱.

Page 13:

signs: i.e. signs of the zodiac.

movements of the earth: i.e. earthquakes

Page 17:

fair: The copy-text omits Mercury in Tarurs.

Page 19:

Scorpio: Elsewhere in this text, including the heading in this section, Digges spells this constellation's name as "Scorpione," which this edition modernizes to "Scorpio." In the body of this section, however, Digges consistently spells it "Scorpio."

Page 20:

Capricorn: Usually Digges writes “Capricorno,” which this edition modernizes to “Capricorn,” but for the last four items in this list, Digges switches to “Capricorn.”

Glossary

This is an alphabetical glossary of terms and names that readers might find unfamiliar. Proper names are not included, but are, rather, included in the historical notes. Terms in the edition that have an entry in this glossary will be marked with an asterisk*.

Abscission: OED s.v. "abscission" The action or process of cutting off or separating something; an instance of this.

1555 L. Digges *Prognostication of Right Good Effect* sig. Biiiv With theyr Quadratures, and Oppositions..Abscissions.

Age of the moon: The age of the Moon is a measure of the phase of the Moon, counting the number of days since the last new moon.[84]

Botch: OED s.v. "botch n.1" def, 2. b. specifically. A swelling, boil, or ulcer affecting a hawk or a domestic animal, esp. a horse. Obsolete.

1566 T. Blundeville *Order curing Horses Dis.* cvi. f. 78, in *Fower Offices Horsemanshippe* The humors will resort into the weakest parts, and theyr gather together, and brede a botch.

Certes: OED s.v. "certes" Archaic. Of a truth, of a certainty, certainly, assuredly. Used to confirm a statement.

c1449 R. Pecock *Repressor* (1860) 8 Wherfore certis if eny man can be sikir for eny tyme that these ij. premyssis be trewe.

c1557 in W. C. Hazlitt *Remains Early Pop. Poetry Eng*. III. 121 Many a man certesse.

[84] Dominic Ford, "Age Of Moon," In-The-Sky.org, accessed July 5, 2020, https://in-the-sky.org/article.php?term=age_of_moon.

Change: OED s.v. “change” def. 13. More fully *change of the moon*. The arrival of the moon at a different phase, spec. the appearance of a new moon; the period of time at which this occurs.

Combustion: Orig. *conbustion*. OED s.v. “combustion” def. 4. Astrol. Obscuration of a planet or star by proximity to the sun. Obs. (In the OED there is no entry for “conbustion.” However, “combustion contains the definition above, supported by an example from 1556. In addition, there is an example from pathology, supported by an example from 1541, that uses the “conbustion” spelling. The dating of the examples supports the idea that this alternate spelling was current.

Conduce: OED s.v. “conduce” def. 6. a. To be profitable or advantageous (to). Obs.

1655 T. Stanley *Hist. Philos.* I. iii. 119 These conduce much to the wise.

Conducible: OED s.v. “conducible” def. 2. Conducive to the desired end; advantageous, expedient, serviceable, beneficial.

a1680 J. Corbet *Humble Endeavour* (1683) i. ix. 7 Sin..cannot be willed of God as a thing convenient or conducible (c.f. “conduce,” above).

Ell: OED s.v. “ell n. 1” Forty-five inches. Originally, an ell was the distance between two parts of the upper body, such as shoulder to fingertip. By Digges’s time, the measure had been standardized to the current length.

1543 R. Record *Ground of Artes* i. sig. N.v 3 foote and 9 ynches make an elle.

Embraid: OED s.v. “embraid” To upbraid, taunt, mock; … Also, to reproach one with, ‘cast in one's teeth’.

1548 Princess Elizabeth & J. Bale tr. Queen Margaret of Angoulême *Godly Medytacyon Christen Sowle* f. 21 With..wordes (whom I knowe to be folyshe) I imbrayded the.

1573 T. Tusser *Points Huswifrie* (new ed.) f. 26v, in Fiue Hundreth Points Good Husbandry (new ed.) If ye be friends, embraid me not.

Epact: OED s.v. "epact" def. 1. b. The number of days in the age of the moon* on the first day of the year (now Jan. 1st, but formerly March 1st or 22nd).

Golden number: The golden number represents when the new moon appears in the lunar, 19-year Metonic cycle. This number is important in computus, and astronomers continue to use it to this day. The golden number is found by dividing the year by 19. Adding 1 to the remainder reveals the golden number for that year. For example, the golden number for the year 2020 is 7, calculated as follows: (2020÷19=106 $^{6}/_{19}$. So, the remainder is 6. Adding one returns 7). If there is no remainder, then the golden number is 19. Interestingly, the same number is returned if we add the one to the year first, then divide by 19.

Gross: OED s.v. "gross" def. 4. Modifying nouns of evil import, and serving as an intensive of their meaning: Glaring, flagrant, monstrous.

def. 4.a. with nouns denoting vices, errors, faults, etc.

1581 J. Bell tr. W. Haddon & J. Foxe *Against Jerome Osorius* 4 Or as though this your tedious quarell about this word Private did ought els, but bewray your grosse ignorance?

Indigestly: OED s.v. "indigest, *adj.* and *n.*" def. A. a. Undigested; crude, immature; shapeless, confused; unarranged.

Landmeater: OED s.v. "land-meter" Obsolete. A land-measurer or surveyor.

1582 E. Worsop (*title*) A discouerie of sundrie errours and faults daily committed by landemeaters..to the damage..of many her Maiesties subiects.

List: OED s.v. “list v. 1” def. 2b. To wish, desire, like, choose.

1563 *2nd Tome Homelyes* Agst. Idolatry ii, in J. Griffiths *Two Bks. Homilies* (1859) ii. 209 The Bishop of Rome..did in all the West Church..what he lust.

a1586 Sir P. Sidney *Arcadia* (1590) ii. xxvi. sig. Ff3v Your grieues, and desires whatsoeuer, & whensoeuer you list, he wil consider of.

Mensuration: OED s.v. “mensuration” def. 1. a. The action, process, or art of measuring; measurement.

?a1560 L. Digges *Geom. Pract.: Pantometria* (1571) i. xxi. sig. F iv. v. If there happen any error in the situation thereof, great inconuenience maye followe in your mensurations.

Meteor: “… all atmospheric phenomena—that is, all natural processes that occurred in the region of Air: clouds, dew, winds, lightning, comets, rainbows, and associated weather processes.”[85]

Meteoroscope: OED s.v. “meteoroscope” Astronomy. Obsolete. def. 1. An instrument for making observations of celestial objects.

1615 T. Tomkis Albumazar ii. v. sig. Ev With Astralobe [sic], and Meteoroscope, Il'e finde the Cuspe [etc.].

One assumes that a *meteoroscoper* is one who uses such a device.

Mids: OED s.v. “mids” def. A. 1. The middle, the middle part or point; the midst. … Usually with reference to space, but occasionally with temporal reference.

1549 *Bk. Common Prayer* (STC 16267) Svpper of the Lorde f. cxxjv The Priest standing humbly afore the middes of the Altar.

[85] S. K. Heninger, *A Handbook of Renaissance Meteorology: with Particular Reference to Elizabethan and Jacobean Literature* (New York, NY: Greenwood, 1968), 3-4.

1583   B. Melbancke *Philotimus* (new ed.) sig. Dd4 v   Now brighte Hyperion was in middes of skie.

Parallax: OED s.v. "parallax" def. 1. a. Difference or change in the apparent position or direction of an object as seen from two different points; (Astronomy) such a difference or change in the position of a celestial object as seen from different points on the earth's surface or from opposite points in the earth's orbit around the sun.

Plage: to calibrate. OED s.v. "plage, n.1" def. 2. Each of the four principal directions or quarters of the compass; the corresponding areas of the celestial sphere. Obsolete.

The OED lists the word only as a noun, whereas Digges is using it as a verb here. The sense seems to be that an instrument is calibrated to the four quarters of the sky.

Prime: Synonym for the golden number (q.v.).

Quadrature: OED s.v. "quadrature" def. 3a Astron. The aspect of an object in the solar system when situated 90 degrees from the sun as seen from earth (formerly also †quadrature aspect); a similar aspect between any two celestial objects or zodiacal signs; frequently in quadrature. Also: each of the two points at which the moon is 90 degrees from the sun as seen from the earth, i.e. midway between the points of conjunction and opposition.

Rear: Orig. *reringe*. OED s.v. "rear, *v.*[1]" def. II. To construct, bring into existence, breed, bring up.

9. a. *transitive*. To construct, esp. by building up; = raise v.1 8. Also figurative.

1548   *Hall's Vnion: Henry VIII* f. lxxiij   A tower..rered by great crafte.

1590   Spenser *Faerie Queene* iii. x. sig. Mm8   Amongst the hiues to reare An hony combe.

Refranation: OED s.v. "refranation" Astrology. Now historical. The prevention of a conjunction of two planets by the retrogression of one of them.

1583 T. Heth *Manifest Confut. Astrol. Disc.* Although they bee in application, yet is the same..preuented by refranation, afore they come to the full conjunction.

Reins: OED s.v. "reins" The OED, under def. I defines the reins as the loins or area of the kidneys.

?1533 G. Du Wes *Introductorie for to lerne Frenche* sig. Ddiv v Gyrte thy raynes as a man.

1560 J. Daus tr. J. Sleidane *Commentaries* xiii. f. clxxviij These Palles, which..hange downe from the shoulders to the midde breast, and to the Reines of the backe, like a stoale.

Sith: OED s.v. "sith" def. 4. a. Seeing that, given that; for the reason that, because. … Since …

a1500 (▸ ?c1450) *Merlin* x. 143 Seth it is so, we shall delyuer yow the rynge.

Supputate: OED s.v. "supputate" To calculate, compute, reckon;

1555 L. Digges *Prognostication Right Good Effect* sig. *iiiv For other Eleuations, or Meridians supputated.

Tertian: OED s.v. "tertian, adj. and n." def. A. 1. *Pathology*. Of a fever or ague: Characterized by the occurrence of a paroxysm every third (i.e. every alternate) day.

1398 J. Trevisa tr. Bartholomew de Glanville *De Proprietatibus Rerum* (Bodl.) vii. xxxix A Feuere Terciane..greueþ fro þe þrid daye to the þrid and namelich aboute þe þrid houre.

1625 J. Hart *Anat. Urines* i. v. 48 During her husbands sicknesse, being a long and tedious, first Tertian, then double Tertian feauer.

Travailed: OED s.v. “travailed” def. 2. Experienced, versed, or learned in a subject, matter, etc., as a result of hard work or study. Frequently (and earliest) with preceding modifying adverb.

1551   T. Wilson *Rule of Reason* Epist. to Kyng sig. Av   Your grace [Edw. VI]..litle nedeth any helpe.., beyng so well trauailed both in the Greke & in the Latine.

Wood: OED s.v. “wood, adj., n.2, and adv.” def. A. 1. a. Out of one's mind, insane, lunatic.

?1529   R. Hyrde tr. J. L. *Vives Instr. Christen Woman* i. x. sig. Lv   They be bytten of ye woode dogge the deuyll: and be fallen woode theyr selfe.

Latin passages found in the copy-text

Following is a list of the Latin passages translated in the edition. They are organized by page number in the order in which they appear. Marginalia are labelled “margin,” and follow the other entries for the page. Marginal notes consisting mostly of astronomical symbols, with only one to three Latin prepositions, are not included.

Page 6:

- Scientia non habet inimicum nisi ignorantem
- contra illos, qui dicunt quod Scientia stellarum non potest sciri ab aliquo: contra illos, qui dixerunt quod scientia stellarum non est utilis, sed potius damnosa &c. contra illos, qui contradicunt judiciis Astronomiae, & qui reprehendunt eam, nescientes dignitatem eius, eo quod non est lucrative
- Epicurei Theologi
- Arrogantiam esse cum summa stultitia coniunctam, venari choragium aliquod gloriae, ex insectatione artium, quae sunt graui autoritate doctorum &c. prudentium receptae
- manifestum insaniæ genus
- quod magis opus habent Medicis, quam Geometris
- Sinamus (ait) una cum Epicuro ineptire
- Id tantum quod pulchrum est, quod purum est quod divinum est, nihil mortale sapiens dulci ardore amplectitur. Ut multa paucis (crede mihi) extingui dulce erit Mathematicarum artium labore
- margin: Vituperant, qui simpliciter eas ignorant

Page 7:

- et scientia est notitia vera conclusionum, quibus propter demonstrationem firmiter assentimur
- Nam incertam vocat hanc artem vulgus, propter errores nou arti, sed bominum indoctissorum inscitie, et temeritati putandos, qui citra delectum omnia effutiunt
- margin: Stulti negligunt et continunt: Qui contradicit, ambitiosus est, Qui maledicit, fatuus

Page 8:

- margin: De observandis meteoris
- margin: Luna rubens ventat, pallor pluit, Alba serenat.

Page 9:

- margin: Cum majora apparent, tum enim Humore medius crassescit aer

Page 10:

- margin: De cometarum peodigiis, lege Cardanum, lib. 4. fol. 83.
- margin: Arcus niss sole aduerso non fiunt. Non apparet nisi cum Vapores rarificantur, vel inspis santur.
- margin: Signum futurorum bellorum.

Page 12:

- margin: Canis minoris efficatia
- margin: Orionis, Arcturi, Coronae, caprae, succularum effectus. ħ. ☌. □ & ☍ cum ☉ aut ☽. ♃. ☌. □ & ☍. cum ☿ cum ☉ Aut ☌ ♂ cum ♀ vel ♌ ♃ cum ♂.

Page 13:

- Certum est omnibus que notum, quod caeli motus, signorum ortus, & occasus, planetarum aspectus, & conjunctiones, luminarium eclypses. &c certissimam, determinatam, ac infallibilem habent causam. Quis iam sanae mentis negabit eorum effectus saepe innotescere, vipote bella, fames, grandines, aeris perturbationes, elementoum commotiones, terrae motus, & similia? Pesitis causis naturalibus, & non impeditis, sequitur effectus.

Page 23:

- margin: Quare lapides pluant, lege Pli, lib, 2, Ca.   44.
- margin: Ros estate, pruina hieme fit.
- margin: Nix humor modice concretus.)
- margin: Grando, pluvia in discensu congelata.
- margin: Ventorum ergo materia, calida & sicca exhalatio.
- margin: Quemadinod<u>um</u> in nube tonitru<u>um</u>, sic in terra tremor.

Page 24:

- Signum est futurorum bellorum
- Tonitruum sonitus est, qui editur quando nubem rumpit balitus (halitus?). Fulmen flamma vel repentinus est ignis, qui ex collisione nubium, aut ruptura nascitur.
- margin: Signa terrae motus
- margin: Fulgetrum prius cerni, quam tonitrum audiri, cum simul fiant, certum est, Pli. lib. 2. Ca. 56. contra Aristo.

Page 25:

- Aut Deus naturæ patitur, aut mundi machina dissoluitur.

- margin: Ventorum causa
- margin: Uniuersalis est Eclipsis Lunæ Non semper in novilunio, sed in ca, et cauda
- margin: Omnium planetarum ad terram magnitudo.
- margin: Hæc incredibilia videntur tantum hiis, qui mathematicis demonstrationibus non assueue runt, &c.

Page 26:

- HÆc non erunt admirationi, si globi capacitatem ex longitudine diametri quaesieris. Continet enim solis dimetiens terrae dimetientem quinquies & semissem. Estque propertio diametri solis ad terrae dimetientem, quae est numeri undecim ad duo, quintupla sesquialtera. Cubus solis mille tercentum unam & triginta partes tales continet, cuiusmodi terrae cubus octonas conplectitur. Cubus enim numeri undecim, est mille tercentum unum & triginta. Cubus vero binarii, qui est terrae, octo. Subducto quoties id fieri potest, minore cu-bo' qui est terrae, à majore qui est solis, cognoscitur cubi ad cubum proportio, & quanto Sol ma-jor, terra sit. Invenimus ergo octo centies, sexagies sexies, in mille tercentum uno & triginta.
- Terrae Diametros Lunae dimetientem complectitur ter, & duas eius diameti i portiones quintas. Est{que} ea proportio, dimetientis terrae ad Lunae diametrum, quae est septen decim ad quin{que} tripla superbipartiens quintas. Cubus numeri septendecim, quater mille nongenta tredecim. Cubus numera quin{que}, est centum viginti quin{que}. Majore cubo per minorem distributo, repe-rimus numerum centum vigintiquin{que}, tricies novies in quater mille nongentis tredecim: quod paululum à superioribus observationibus diftert.
- margin: *Dimetiens ⊙ ad terrae dime tientem 11 ad 2.*

- margin: Cubus 1331 Terrae .8.
- margin: Note 3: *Dimetiens terrae ad diam: ☽.17, ad 5. Cubus terrae 4913. Cubus ☽125.*

Page 32:

- margin: Malum minui, vel purgatio-nibus uti, tem pore caloris, propter defectum humoris

Page 33:

- margin: Haec diligentissime observare oportet solertem Medi cum, nisi majora pericula cogant.

Page 34:

- Omnis putredo ab aqueo humido ortum habet

Page 35:

- Caluitium prohibet, oleum Tartari

Bibliography of primary sources

Aristotle, Erwin Wentworth Webster, and J. A. Smith. "Meteorologica." Essay. In *The Works of Aristotle*, edited by W. D. Ross, 338a–390b. Oxford: Clarendon Press, 1931.

Bonatti, Giudo. *Liber Astronomiae: Part 1*. Edited by Robert Hand. Translated by Robert Zoller. Berkely Springs, WV: Golden Hind Press, 1994.

Cardano, Girolamo. "De Subtilitate, Book 13." Corpus Corporum. University of Zurich. Accessed July 5, 2020. http://www.mlat.uzh.ch/MLS/xfromcc.php?tabelle=Cardanus_Hieronymus_cps4.

Chaucer, Geoffrey. *A Treatise on the Astrolabe*. Edited by Sigmund Eisner. 6. Vol. 6. A Variorum Edition of the Works of Geoffrey Chaucer. Norman, OK: University of Oklahoma Press, 2002.

Digges, Leonard. *A boke named Tectonicon briefely shewynge the exacte measurynge, and speady reckenynge all maner lande, squared tymber, stone, steaples, pyllers, globes. [et]c. Further, declaringe the perfecte makinge and large vse of the carpenters ruler, conteyninge a quadrant geometricall: comprehendinge also the rare vse of the squire. And in thende a lyttle treatise adioyned, openinge the composicion and appliancie of an instrument called the profitable staffe. With other thinges pleasaunt and necessary, most conducible for surueyers, landemeaters, ioyners, carpenters, and masons*. EEBO. London: Printed by Thomas Gemini, 1556. https://quod.lib.umich.edu/e/eebo/A20450.0001.001/1:2?rgn=div1;view=fulltext

———. *A Prognostication of right good effect fruitfully augmented, containing plain, brief, pleasant, chosen rules, to judge the weather forever, by the Sun, Moon, Stars, Comets, Rainbow, Thunder, Clouds, with other Extraordinary tokens, not omitting the Aspects of Planets, with a brief judgement forever, of Plenty, Lack, Sickness, Death, Wars, etc. Opening also many natural causes, worthy to be known*. Google Books. London: Printed by Thomas Gemini, 1555.

Digges, Leonard, and Thomas Digges. *A Geometrical Practice Named Pantometria diuided into three bookes, longimetra, planimetra, and stereometria, containing rules manifolde for mensuration of all lines, superficies and solides: with sundry straunge conclusions both by instrument and without, and also by perspectiue glasses, to set forth the true description or exact plat of an whole region: framed by Leonard Digges gentleman, lately finished by Thomas Digges his sonne. Who hathe also thereunto adioyned a mathematicall treatise of the fiue regulare Platonicall bodies, and their Metamorphosis or transformation into fiue other equilater vniforme solides Geometricall, of his owne inuention, hitherto not mentioned of by any geometricians.* Proquest. London: Henrie Bynneman , 1571.

———. *An Arithmeticall Militare Treatise, Named Stratioticos: Compendiously Teaching the Science of Numbers, as Vvell in Fractions as Integers, and so Much of the Rules and Equations Algebraicall and Arte of Numbers Cossicall, as Are Requisite for the Profession of a Soldiour. Together with the Moderne Militare Discipline, Offices, Lawes and Dueties in Euery Wel Gouerned Campe and Armie to Be Obserued*. Proquest. London: Printed by Henrie Bynneman, 1579.

Goulart, Simon. *A Learned Summary upon the Famous Poeme of William of Saluste Lord of Bartas.* Translated by Thomas Lodge. London: J. Grismand, 1621.

Gratarolo, Guglielmo. *Gulielmi Grataroli Bergomatis Artium & Medicine Doctoris Opuscula.* Google Books. Lyon: Gabriel Coteri, 1558.

Pliny the Elder. “Pliny the Elder's Natural History – Book 2.” Lacus Curtius. Accessed June 25, 2020. https://penelope.uchicago.edu/Thayer/L/Roman/Texts/Pliny_the_Elder/2*.html.

———. Translated by Philemon Holland. “The Second Booke of Plinies Naturall History.” University of Chicago. Accessed June 25, 2020. http://penelope.uchicago.edu/holland/pliny2.html.

Ptolemy, Claudius. *Ptolemy's Quadripartite: or, Four Books Concerning the Influences of the Stars, Faithfully Render'd into English from Leo Allatius ... ; to Which Is Added Variety of Notes ... and Also an Appendix ... Concerning Part of Fortune*. Translated by John Whalley and Leone Allacci. *Gale, Eighteenth Century Collections Online*. London: John Sprint, 1701.

Ringelbergius, Joachimus Fortius. *The Celebrated Treatise of J.F. Ringelbergius. De Ratione Studii*. Translated by George Butler Earp. Google Books. London: Simpkin and Marshall, 1830.

Virgil. “Georgics, Book 1.” Edited by J. B. Greenough. Perseus Project. Accessed June 25, 2020. http://www.perseus.tufts.edu/hopper/text?doc=urn:cts:latinLit:phi0690.phi002.perseus-eng1:1.204-1.230.

Bibliography of Secondary Sources

Abdukhalimov, Bahrom. "Ahmad Al-Farghani And His Compendium Of Astronomy," *Journal of Islamic Studies* 10, no. 2 (January 1999): pp. 142-158, https://doi.org/10.1093/jis/10.2.142.

Andersen, Kirsti. *The Geometry of an Art: the History of the Mathematical Theory of Perspective from Alberti to Monge*. New York: Springer, 2008.

Buhler, Curt F. "Sixteenth-Century Prognostications: Libri Impressi Cum Notis Manuscriptis--Part II." *Isis* 33, no. 5 (March 1942): 609–20. https://doi.org/10.1086/358625.

Burtt, Edwin A. *The Metaphysical Foundations of Modern Physical Science*. London: Routledge, 1924.

"Caput." ΛΟΓΕΙΟΝ. University of Chicago. Accessed June 26, 2020. https://logeion.uchicago.edu/caput.

Clark, David H., and F. Richard Stephenson. "The New Star of Tycho Brahe." Essay. In *The Historical Supernovae. The Study of Supernova Remnants Based on Historical Observations*, 172–90. Oxford: Pergamon Press, 1976.

Clucas, Stephen. *John Dee: Interdisciplinary Studies in English Renaissance Thought*. Dordrecht: Springer, 2006.

Cohen, Adam Max. *Shakespeare and Technology: Dramatizing Early Modern Technological Revolutions*. NY, NY: Palgrave Macmillan, 2006.

Crane, Mary Thomas. *Losing Touch with Nature: Literature and the New Science in Sixteenth-Century England*. Baltimore, MD: Johns Hopkins Univ. Press, 2014.

———. "Marlowe and the New Science." Essay. In *Christopher Marlowe in Context*, edited by Emily Carroll Bartels and Emma Smith, 252–61. Cambridge, MA: Cambridge University Press, 2013.

Dante. *Inferno*. Edited by Robert Hollander. Translated by Jean Hollander. New York: Random House, 2000.

d'Ewes, Simonds. "Journal of the House of Commons: March 1563," in *The Journals of All the Parliaments During the Reign of Queen Elizabeth*. (Shannon, Ire: Irish University Press, 1682), 86-90. *British History Online*, accessed June 19, 2020, http://www.british-history.ac.uk/no-series/jrnl-parliament-eliz1/pp86-90.

Emden, Alfred Brotherston. *A Biographical Register of the University of Oxford, A.D. 1501 to 1540*. Oxford: Clarendon Press, 1974.

Erler, Mary C. "The Laity." Essay. In *A Companion to the Early Printed Book in Britain, 1476-1558*, edited by Vincent Gillespie and Susan Powell, 134–49. Cambridge: D.S. Brewer, 2014.

Evans, James. *The History and Practice of Ancient Astronomy*. New York, NY: Oxford University Press, 1998.

Ford, Dominic. "Age Of Moon." In-The-Sky.org. Accessed July 5, 2020. https://in-the-sky.org/article.php?term=age_of_moon.

Giglioni, Guido, "Girolamo [Geronimo] Cardano", *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2019/entries/cardano/>.

"Grynaeus or Grunaeus, Simon." McClintock and Strong Biblical Cyclopedia Online. Accessed July 24, 2020. https://www.biblicalcyclopedia.com/G/grynaeus-or-grunaeus-simon.html.

"Guglielmo Gratarolo, The Castle of Memory (1562)." Cambridge Core. Cambridge University Press, August 2016. https://www.cambridge.org/core/books/memory-arts-in-renaissance-england/guglielmo-gratarolo-the-castle-of-memory-1562/DB398CA352F382DE167948C6F3DE196F.

Hackett, Jeremiah, "Roger Bacon", *The Stanford Encyclopedia of Philosophy* (Summer 2020 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2020/entries/roger-bacon/>.

Hasted, Edward. "Parishes: Barham." In *The History and Topographical Survey of the County of Kent: Volume 9*. (Canterbury: W Bristow, 1800), 350-358. *British History Online*, accessed June 18, 2020, http://www.british-history.ac.uk/survey-kent/vol9/pp350-358.

Heidarzadeh, Tofigh. *A History of Physical Theories of Comets, from Aristotle to Whipple*. Dordrecht: Springer, 2013.

Heninger, S. K. *A Handbook of Renaissance Meteorology: with Particular Reference to Elizabethan and Jacobean Literature*. New York, NY: Greenwood, 1968.

Heninger, S. K. "Tudor Literature of the Physical Sciences." *Huntington Library Quarterly* 32, no. 2 (February 1969): 101–33. https://doi.org/10.2307/3816682.

Johnson, Francis Rarick. *Astronomical Thought in Renaissance England*. New York, NY: Octagon, 1968.

Johnson, Francis R., Sanford V. Larkey, and Thomas Digges. "Thomas Digges, the Copernican System, and the Idea of the Infinity of the Universe in 1576." *The Huntington Library Bulletin*, no. 5 (April 1934): 69–117. https://doi.org/10.2307/3818095.

Johnston, Stephen. "Digges, Thomas (c. 1546–1595), Mathematician and Member of Parliament." In *Oxford Dictionary of National Biography*, edited by Lawrence Goldman, September 23, 2004. https://www.oxforddnb.com/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-7639.

———. "Like Father, like Son? John Dee, Thomas Digges and the Identity of the Mathematician." Essay. In *John Dee: Interdisciplinary Studies in English Renaissance Thought*, edited by Stephen Clucas, 65–81. Dordrecht, NL: Springer, 2006.

Knox, Dilwyn, "Giordano Bruno", *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2019/entries/bruno/>.

Kusukawa, Sachiko. *The Transformation of Natural Philosophy: The Case of Philip Melanchthon*. Cambridge: Cambridge University Press, 2011.

Lewis, Neil, "Robert Grosseteste", *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2019/entries/grosseteste/>.

Loades, D. M. *Two Tudor Conspiracies*. London: Cambridge University Press, 1965.

Ronan, Colin A. "Leonard and Thomas Digges." *Endeavour* 16, no. 2 (1992): 91–94. https://doi.org/10.1016/0160-9327(92)90008-d.

———. "The Origins of the Reflecting Telescope." *Journal of the British Astronomical Association* 101, no. 6 (1991): 335–340.

Sherman, William H. *John Dee: The Politics of Reading and Writing in the English Renaissance*. Amherst, MA: University of Massachusetts Press, 1995.

Slights, William W. E. “Back to the Future -- Littorally: Annotating the Historical Pagge.” Essay. In *The Future of the Page*, edited by Peter Stoicheff and Andrew Taylor, 71–89. Toronto: University of Toronto Press, 2004.

Smith, Robin. “Aristotle's Logic.” Stanford Encyclopedia of Philosophy. Stanford University, February 17, 2017. https://plato.stanford.edu/entries/aristotle-logic/?PHPSESSID=6b8dd3772cbfce0a28a6b6aff95481e8.

Stationers' Register Online. Accessed July 5, 2020. https://stationersregister.online.

Stiglmayr, Joseph. “Dionysius the Pseudo-Areopagite.” Catholic Encyclopedia: Dionysius the Pseudo-Areopagite, 1909. https://www.newadvent.org/cathen/05013a.htm.

Taylor, E. G. R. “A Regional Map of the Early XVIth Century.” *The Geographical Journal* 71, no. 5 (1928): 474–79. https://doi.org/10.2307/1783281.

———. *The Mathematical Practitioners of Tudor & Stuart England. (Published for the Institute of Navigation.)*. New York, NY: Cambridge, 1954.

Unguru, Sabetai. “Witelo and Thirteenth-Century Mathematics: An Assessment of His Contributions.” *Isis* 63, no. 4 (1972): 496–508. https://doi.org/10.1086/350999.

Van Duzer, Chet. “The Reluctant Cosmographer: Johannes Stöffler (1452–1531) and the Discovery of the New World.” *Terrae Incognitae* 49, no. 2 (2017): 132–48. https://doi.org/10.1080/00822884.2017.1351647.

Wells, Stanley, and Gary Taylor. *William Shakespeare: A Textual Companion*. New York, NY: W.W. Norton, 1997.

Historical notes

These are notes of historical relevance, including descriptions of famous persons. These entries are keyed to the text using lowercase Roman numerals.

---

[i] This is the title of the first chapter of Guido Bonatti's *Liber Astronomiae.* Written ca. 1277, it was a sweeping, encyclopedic work. Bonatti does not write any string of running text that says these things. The phrases that follow are the titles of some of the subheadings of his Liber Astronomiae that follow "De utilitate." *(*Giudo Bonatti, *Liber Astronomiae: Part 1*, ed. Robert Hand, trans. Robert Zoller [Berkely Springs, WV: Golden Hind Press, 1994], 1.) Guido the "domestic astrologer to Guido da Montefeltro," is placed in the eighth circle of Hell by Dante, with his head twisted around backward on his body for the sin of trying to see into the future. (Dante, *Inferno*, ed. and trans. Robert Hollander, trans. Jean Hollander (New York: Random House, 2000), l. 118 and note.)

[ii] Bonatti, ch. IV, pp. 7-11.

[iii] Bonatti ch IX, pp. 18-24.

[iv] Bonatti, ch. VIII, pp. 15-17.

[v] Melancthon, Philip: **(**February 15, 1497–April 19, 1560) a humanist thinker, educator, and theologian. Although he was the author of many works, his *Augsburg Confession* is likely his best known. (*Encyclopædia Britannica* (2020), s.v. "Philipp Melanchthon.")

[vi] Grynaeus was an outspoken Protestant and an advocate for educational improvement in German universities. In 1538, he published a Latin translation of Ptolemy's Almagest. ("Grynaeus or Grunaeus, Simon," McClintock and Strong Biblical Cyclopedia Online, accessed July 24, 2020, https://www.biblicalcyclopedia.com/G/grynaeus-or-grunaeus-simon.html.)

[vii] Schöner, Johannes: (1477–1547) A Catholic priest, publisher, astronomer, and mathematician, Schöner is perhaps best known as a maker of globes and other astronomical instruments.

[viii] Cardano, Girolamo: (1501–1576) Originally Cardanus. Cardano was an extremely prolific writer, but here Digges cites his work on comets, wherein he concludes that comets exist above the moon, that they produce their tails by refracting the sun's light, and that they have "three different motions … east-west … west-east … and a motion in latitude." (Tofigh Heidarzadeh, *A History of Physical Theories of Comets, from Aristotle to Whipple* (Dordrecht: Springer, 2013), 39.) Cardano maintained that there were three elements (earth, water, and air) plus "celestial heat," which flowed from God and which formed "the connective element between heaven and earth." (Guido Giglioni, "Girolamo [Geronimo] Cardano", *The Stanford Encyclopedia of Philosophy* (Summer 2019 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/sum2019/entries/cardano/>.)

[ix] Aristotle's *Posterior Analytics* is part of his *Organon*. The *Posterior Analytics*, "contains [Aristotle's] account of demonstrations and their role in knowledge," (Robin Smith, "Aristotle's Logic," Stanford Encyclopedia of Philosophy [Stanford University, February 17, 2017], https://plato.stanford.edu/entries/aristotle-logic/?PHPSESSID=6b8dd3772cbfce0a28a6b6aff95481e8.) which, in the context of Digges's point about Guido, means syllogistic reasoning.

[x] Here, Digges refers to Ptolemy's *Tetrabiblos* (also known as the *Quadripartitum*) book 2, chapter 7. In it, Ptolemy discussed the appearance of the Sun and what it can mean, much as Digges does here. Claudius Ptolemaeus, *Ptolemy's Quadripartite: or, Four Books Concerning the Influences of the Stars, Faithfully Render'd into English from Leo Allatius ... ; to Which Is Added Variety of Notes ... and Also an Appendix ... Concerning Part of Fortune*, trans. John Whalley and Leone Allacci (London: John Sprint, 1701), 85.

[xi] Stöffler, Johannes: (1452–1531) Originally *Staeflerinus*. He was a "geographer … mathematician, astronomer, astrologer, and priest" who taught Philip Melancthon, among other famous thinkers, at the University of

Tubingen. (Chet Van Duzer, “The Reluctant Cosmographer: Johannes Stöffler (1452–1531) and the Discovery of the New World,” *Terrae Incognitae* 49, no. 2 (2017): pp. 132-148, https://doi.org/10.1080/00822884.2017.1351647, 135.)

[xii] Regiomontanus: (1436–1476) Originally Monteregius. Born in Königsberg (now Kaliningrad), Regiomontanus is an astronomer perhaps best known for his work on calendar reform. Hartmann has suggested that Regiomontanus may have originated the concept of the revolving Earth and introduced it to Copernicus through Regiomontanus’s student, and Copernicus’s teacher, Novara.

[xiii] Little is known of Leupoldus other than that he wrote an influential treatise known as *Compilatio de astrorum scientia*, a work that deals with celestial signs and their portents. (Curt F. Buhler, “Sixteenth-Century Prognostications: Libri Impressi Cum Notis Manuscriptis--Part II,” *Isis* 33, no. 5 (March 1942): pp. 609-620, https://doi.org/10.1086/358625, 613.)

[xiv] In the margin: Here Digges cites *De subtilitate*, a work by Girolamo Cardano. (Girolamo Cardano, “De Subtilitate, Book 13,” Corpus Corporum (University of Zurich), accessed July 5, 2020, http://www.mlat.uzh.ch/MLS/xfromcc.php?tabelle=Cardanus_Hieronymus_cps4.)

[xv] This refers to the first book of Virgil’s *Georgics*. Here, the poet discusses agriculture and weather. In particular, lines 204–258 treat celestial lore and its bearing on weather and planting practices. The reference to “At Bor.” refers to a line earlier in Book 1, line 93, where the poet refers to the frigidity of the north wind. (Virgil, “Georgics, Book 1,” ed. J. B. Greenough, Perseus Project, accessed June 25, 2020, http://www.perseus.tufts.edu/hopper/text?doc=urn:cts:latinLit:phi0690.phi002.perseus-eng1:1.204-1.230.)

[xvi] Refers to the *Naturalis Historia*, by Pliny the Elder. In chapter XL of book 2, he speaks of all these phenomena occurring at the rise of the Little Dog. (Pliny the Elder, “Pliny the Elder's Natural History – Book 2,” Lacus Curtius, accessed June 25, 2020, https://penelope.uchicago.edu/Thayer/L/Roman/Texts/Pliny_the_Elder/2*.html.)

[xvii] Pliny, trans. Philemon Holland, The Second Booke of Plinies Naturall History (University of Chicago), accessed July 4, 2020, http://penelope.uchicago.edu/holland/pliny2.html, Chapter XXXVIII. As can be seen here, the chapter referenced in the marginal note is 38, not 44. I consulted both this English edition and the following in Latin: Pliny the Elder, “Pliny the Elder's Natural History – Book 2,” Lacus Curtius, accessed June 25, 2020, https://penelope.uchicago.edu/Thayer/L/Roman/Texts/Pliny_the_Elder/2*.html. Both agree.

[xviii] In his *Meteorologica*, book 2, chapter 9, Aristotle does indeed maintain that thunder precedes lightning, but that it appears otherwise to us because “sight is quicker than hearing.” (Aristotle, “Meteorologica,” in *The Works of Aristotle*, ed. W. D. Ross (Oxford: Clarendon Press, 1931), pp. 338a-390b, 369b.)

[xix] Dionysius Areopagita is a pagan astronomer who is said to have been in Egypt when Christ was crucified. When he witnessed the celestial events Digges writes of, he uttered the words translated in the text. (Simon Goulart, *A Learned Summary upon the Famous Poeme of William of Saluste Lord of Bartas.*, trans. Thomas Lodge (London: J. Grismand, 1621), 198, STC 21666. https://books.google.com/books?id=xGxjAAAAcAAJ&dq=Aut+Deus+natur%C3%A6+patitur,+aut+mundi+machina+dissoluitur&source=gbs_navlinks_s.) Dionysius is now known as Pseudo-Dionysius the Areopagite, as the writings we have from this author are pseudepigraphically attributed to Dionysius. (Joseph Stiglmayr, “Dionysius the Pseudo-Areopagite,” Catholic Encyclopedia: Dionysius the Pseudo-Areopagite, 1909, https://www.newadvent.org/cathen/05013a.htm.)

[xx] Digges refers here to Archimedes’ derivation of the formula πr^2 for determining the area of a circle.

[xxi] Alfraganus (born c. A.D. 797) is an astronomer about whom little is known. He was most likely born in what is today Uzbekistan. (Bahrom Abdukhalimov, “Ahmad Al-Farghani And His Compendium Of Astronomy,” *Journal of Islamic Studies* 10, no. 2 (January 1999): pp. 142-158, https://doi.org/10.1093/jis/10.2.142, 143.) He is best known for writing Elements of Astronomy, a work in Arabic that comprises “a short introductory course in astronomy based on Ptolemy's Almagest.” In chapter 4, he lays out the case for the small size of the Earth in relation to the stars. (ibid., 148-149.)

[xxii] Girolamo Cardano, “De Subtilitate, Book 13,” Corpus Corporum (University of Zurich), accessed July 5, 2020, 504, http://www.mlat.uzh.ch/MLS/xfromcc.php?tabelle=Cardanus_Hieronymus_cps4.

[xxiii] Girolamo Cardano, “De Subtilitate, Book 21,” Corpus Corporum (University of Zurich), accessed July 5, 2020, 466, http://www.mlat.uzh.ch/MLS/xfromcc.php?tabelle=Cardanus_Hieronymus_cps4.

[xxiv] Today more popularly known as Arcturus, brightest star in the Northern Hemisphere.