

ADAM MOSLEY

**PAST PORTENTS PREDICT:
COMETARY *HISTORIAE* AND
CATALOGUES IN THE SIXTEENTH
AND SEVENTEENTH CENTURIES**

ESTRATTO

da

CELESTIAL NOVELTIES
ON THE EVE
OF THE SCIENTIFIC
REVOLUTION
1540-1630

EDITED BY

DARIO TESSICINI and PATRICK J. BONER

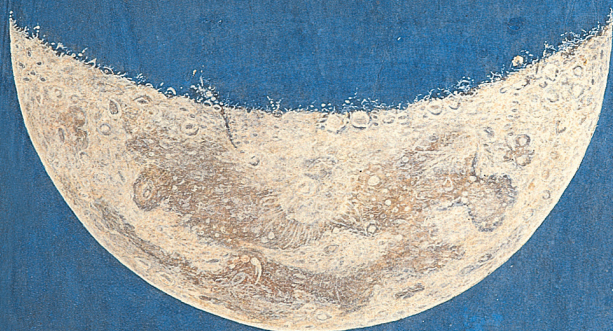


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CASA EDITRICE LEO S. OLSCHKI
Viuzzo del Pozzetto, 8
50126 Firenze
www.olschki.it

Il volume è stato pubblicato grazie al contributo di



MINISTERIO
DE ECONOMÍA
Y COMPETITIVIDAD

ISBN 978 88 222 6254 7

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ADAM MOSLEY

PAST PORTENTS PREDICT:
COMETARY *HISTORIAE* AND CATALOGUES
IN THE SIXTEENTH AND SEVENTEENTH CENTURIES¹

Twenty-first century astronomers with an interest in past appearances of comets might well turn to a reference work in order to satisfy their curiosity: Gary W. Kronk's multivolume *Cometography: A Catalog of Comets*.² The first volume of this series, which spans antiquity to 1799, displays a familiarity with ancient, medieval, and early modern sources, both western and oriental, that might put any historian of these periods to shame. Drawing on these accounts, Kronk attempts to present all the recoverable information about the physical characteristics of every comet observed, including, when possible, the comet's closest approach to the Earth, greatest and least solar elongations, northern- and southernmost declinations, and estimated absolute magnitude.³ As Kronk acknowledges, however, his *Cometography* is only the latest example of a longstanding genre. A notable eighteenth-century predecessor, with a similar name, is Alexandre Guy Pingré's *Cométographie ou Traité Historique et Théorique des Comètes*.⁴ And in the seventeenth-century Johannes Hevelius

¹ I am extremely grateful to Karen Moran, of The Royal Observatory, Edinburgh, and Monica Azzolini, of the University of Edinburgh, for facilitating my use of the extensive comet-related literature in the Crawford Collection at the Observatory; and to both the Special Collections department of the University of Aberdeen and the Science Museum Library at Wroughton for allowing me access to their sixteenth- and seventeenth-century cometological literature. A version of this essay was presented at the conference *Celestial Novelties, Science and Politics on the Eve of the Scientific Revolution (1540-1630)*, Museo Galileo, Florence, September 2011; I would like to record my gratitude to the organisers of that conference, Dario Tessicini, Patrick Boner and Miguel Angel Granada, and to the other participants, whose comments and own contributions have proved invaluable in revising it for publication.

² GARY W. KRONK, *Cometography: A Catalog of Comets*, 5 vols., Cambridge, Cambridge University Press, 2000-2010.

³ *Ivi*, vol. I, ix-x.

⁴ ALEXANDRE GUY PINGRÉ, *Cométographie ou Traité Historique et Théorique des Comètes*, 2 vols., Paris, L'Imprimerie Royale, 1783-1784.

published a *Cometographia* which included a *historia*, or catalogue, of all the comets prior to the ones which were the focus of his analysis, those of 1652 to 1665.⁵

Though Hevelius published before it was appreciated that comets were periodic phenomena, his work, like that of Pingré and Kronk, can be seen as a form of historical *astronomy*, extracting from earlier observations the information required to determine the physical characteristics and motions of cometary phenomena. But as Hevelius recognised, there were even earlier forms of the genre, shaped by a rather different agenda:

Indeed I do not deny that histories of comets of this kind have already been compiled and published by certain persons: namely, to say nothing of the others, by Antoine Mizauld, Ludwig Lavater, Abraham Rockenbach, and Heinrich Eckstorm. But since many, not to say almost all, compiled their writings so that (wholly persuaded to be sure, that comets are announcers of disasters, the death of kings and princes, regime change and great misfortunes) they might benefit astrological matters, they cultivate these, and their opinion concerning the adverse signification of comets, once it has taken hold, they render firm and fixed in whatsoever way they can (although sometimes it is done feebly enough, and with less suitable examples, it ought to be admitted), and rouse and cause fear in men – although in my judgment it is worthless.⁶

Before they were the preserve of historical astronomy, in other words, cometary histories and catalogues were produced by individuals with an interest in historical *astrology*, and were used in defence of the claim that comets were

⁵ JOHANNES HEVELIUS, *Cometographia, Totam Naturam Cometarum; Utpote Sedem, Parallaxes, Distantias, Ortum & Interitum, Capitum, Caudarumque diversas facies, affectionesque, NEC NON Motum eorum summe admirandum, Beneficio unius, eiusque fixae, & convenientis hypotheseos exhibens. In qua, Universa insuper PHAENOMENA, QUAESTIONESQUE de Cometis omnes, rationibus evidentibus deducuntur, demonstrantur, Ac Iconibus aeri incisis plurimus illustrantur. Cumprimis vero, COMETAE ANNO 1652, 1661, 1664 & 1665 ab ipso Auctore, summo studio observati, aliquanto prolixius pensiculatiusque exponuntur, expenduntur, atque rigidissimo calculo subiiciuntur. Accessit, Omnium Cometarum, a Mundo condito hucusque ab Historicis, Philosophis, & Astronomis annotatorum, HISTORIA, Notis & Animadversionibus Auctoris locupletata, cum peculiari Tabula Cometarum Universalis, Gdansk, Simon Reiniger, 1668.*

⁶ *Ivi*, pp. 791-792: «Non diffiteo quidem, huius generis Historias Cometarum a quibusdam iam olim congestas, editasque esse: utpote, alios ut modo praeteream, ab Antonio Myzaldo, Ludovico Lavathero, Abrahamo Rockenbachio, & Henrico Eckstormio; verum quoniam plerique, ne dicam fere omnes, Scriptis suis eo collinearunt (omnino nempe persuasi, Cometas nuncios esse calamitatum, Regum Principumque interitus, mutationis Regnorum ac magnarum cladum) quo Astrologicae subvenirent, eam excolerent, opinionemque suam semel arreptam de adversis Cometarum significationibus, quocumque modo possent (ut ut nonnunquam satis frigide, ac exemplis minus convenientibus id factum esse, fateri oporteat) firmam fixamque redderent, nec non hominibus metum, quam meam sententia inanem, concitarent iniicerentque [...]».

portents of ill-omen. In this article, we shall see how the genre came about, and how it was used to support the view that past comets – and therefore present and future comets – signified disaster. We shall also discover, however, how a handful of commentators in the later sixteenth century began to reject this kind of historical inference, thereby paving the way for the evolution of cometography into the form familiar to astronomers today. Consideration of this material offers more, however, than insight into a single astronomical genre. It also helps to reappraise the context for more familiar cometological works of the sixteenth century, such as Tycho Brahe’s account of the comet of 1577, the agenda of which has tended to dominate the historiography of this topic. It becomes possible, as a result, to clear up some puzzles left by the mid-twentieth century account of astronomical study of comets in the early modern period.

THE WITTENBERG CONNECTION: MIZAULD, EBER, AND THE *COMETOGRAPHIA*

The view that comets were signs – or in some accounts, causes – of important and frequently terrible events was well-established by the start of the sixteenth century, and often explained in physical, which is to say, natural philosophical, terms. It derived much of its strength from Aristotle’s *Meteorology* and Ptolemy’s *Tetrabiblos*, and from the intertwined natural philosophical and astrological traditions of the Islamic world which drew on these texts and were later imported into the Latin West.⁷ Thus, in a scholastic tradition which stretched from the thirteenth to the seventeenth centuries, and which included such luminaries as Thomas Aquinas and Albertus Magnus, writers on comets frequently not only considered their nature and place in the universe, but also undertook to explain their association with disasters with reference to material, formal, efficient, and final causation. Though they ultimately agreed with Aristotle that comets were meteorological phenomena, scholastic authors considered the possibility – suggested by Seneca, among others – that they were celestial.⁸ And they explored their association with events in the heavens, which included the role that heavenly bodies played

⁷ ARISTOTLE, *Meteorologica*, 342b25-345a10; PTOLEMY, *Tetrabiblos*, II.9 and II.13. On the intertwining of scholastic natural philosophy and the Ptolemaic-Arabic astrological tradition, see RICHARD LEMAY, *Abu Ma’shar and Latin Aristotelianism in the Twelfth Century: The Recovery of Aristotle’s Natural Philosophy through Arabic Astrology*, Beirut, American University of Beirut, 1982.

⁸ LYNN THORNDIKE (ed.), *Latin Treatises on Comets between 1238 and 1368 A.D.*, Chicago, University of Chicago Press, 1950.

in drawing together the terrestrial exhalations from which comets were formed. Such planetary influences were also thought to shape the events on Earth that were considered to be effects of cometary appearances, or concomitant effects of their causes. Thus, cometary divination can be described as astrological in character, even though comets themselves were not normally judged superlunary.

In discussing the events that were thought to attend cometary appearances, it was common to mention a handful of recent or more distant examples. Aristotle himself referred to the 'great comet' which appeared during the archonship of Asteius, associating it with an earthquake and a tidal wave;⁹ Latin writers on natural phenomena including Pliny and Seneca, and poets and historians ranging from Aratus to Suetonius and Claudian, provided later commentators with a range of citable instances. For the most part, however, such accounts were fully integrated into the body of the text in which they appeared, and were compiled and presented haphazardly. Prior to the sixteenth century, they did not possess the form of a catalogue, chronologically ordered, of all the comets known to have appeared over a significant period.

More systematic treatments of past comets began to emerge in the 1530s and 1540s, amongst the cohort of Lutheran scholars who included, and followed, Philip Melanchthon. That study of cometary signification should have appealed to the Philippists is hardly surprising. As Sachiko Kusakawa and Charlotte Methuen in particular have demonstrated, astrological causation came to occupy an important place in Melanchthon's natural philosophy and medicine and, because of the lessons that they conveyed about providence, both astrology and astronomy were emphasised in the curriculum that he instituted at Wittenberg and that was subsequently rolled out across other Lutheran universities. Comets fitted readily into the Philippist cosmology of secondary causes and divine messages that could, and should, be interpreted providentially; indeed, Melanchthon's sight of one, in August 1531, and subsequent conviction that it portended disaster, appears to have played an important role in shaping his emphasis on the study of the skies.¹⁰ Close associates

⁹ ARISTOTLE, *Meteorologica*, 343a35-343b4.

¹⁰ SACHIKO KUSUKAWA, *Aspectio Divinorum Operam: Melanchthon and Astrology for Lutheran medics*, in ANDREW CUNNINGHAM – OLE PETER GRELL (eds.), *Medicine and the Reformation*, London, Routledge, 1993, pp. 33-56, and KUSUKAWA, *The Transformation of Natural Philosophy: The Case of Philip Melanchthon*, Cambridge, Cambridge University Press, 1995, especially pp. 124-134; CHARLOTTE METHUEN, *The Role of the Heavens in the Thought of Philip Melanchthon*, «Journal of the History of Ideas», 57 (1996), pp. 385-403, and ID., *Kepler's Tübingen: Stimulus to a Theological Mathematics*, Aldershot, Ashgate, 1998, especially pp. 61-106.

of Melanchthon certainly paid comets particular attention subsequently, devoting both whole works to the topic and parts of larger texts on appropriate themes. Thus in 1532, Joachim Camerarius the Elder (1500-1574) published at Wittenberg the *Norica sive de ostentis libri duo*, with an endorsement by Melanchthon in the form of a dedicatory preface addressed to, and extravagantly praising, the Italian astrologer Luca Gaurico (1476-1558).¹¹ This work purported to be a record of a conversation between Camerarius and a number of other scholars occasioned by a particular comet, but extending to consider such phenomena more generally. It constituted a compilation of, for the most part, ancient texts and examples, rendered less readable, not more, by its dialogue form. But, as its title suggests, it strongly supported the interpretation of comets as signs of future events. In 1558, Camerarius revisited the subject in his *De eorum qui cometae appellantur, nominibus, natura, causis, significatione*, published at Leipzig. This text, prompted once again by the appearance of a particular comet, emphasised that, whatever their nature – something that philosophers disputed – comets were portents, as well as instruments of God, and knowledge of what they foretold was the best safeguard against the great anxiety and troubles that followed their appearance.¹² Furthermore, the possibility of being so forewarned, and of averting disaster through prayer – warnings and preparations that the impious would, of course, neglect – demonstrated how providentially God had ordered things, so that his punishment for impiety would fall most heavily on those who most deserved chastising.¹³

Between Camerarius's two treatments there also appeared the commentary by Jakob Milich (1501-1559) on the second book of Pliny's *Natural History*; published at Hagenau in 1535, and revised and republished in 1538 and 1543, and again in 1558, the work originated in a course of lectures first delivered at Wittenberg in 1534.¹⁴ This course must have formed part of the attempt, instituted by Melanchthon, to base instruction in natural philosophy on Pliny rather than Aristotle, and in the sixteenth century some thought that it was the work of Melanchthon himself.¹⁵ In composing his text, Milich drew

¹¹ JOACHIM CAMERARIUS, *Norica sive de Ostentis Libri Duo*, Wittenberg, Georg Rhau, 1532.

¹² I have used the later edition, CAMERARIUS, *De eorum qui cometae appellantur, nominibus, natura, causis, significatione*, Leipzig, Johannes Steinman, 1578; see sig. A2r.

¹³ *Ivi*, pp. 17-21.

¹⁴ I have used the 1543 edition, JAKOB MILICH, *Liber II C. Plinii de mundi historia. Cum commentariis*, Frankfurt, Ex officina Petri Brubachii, 1543.

¹⁵ CHARLES G. NAUERT, *C. Plinius Secundus (Naturalis Historia)*, in PAUL OSKAR KRISTELLER – F. EDWARD CRANZ (eds.), *Catalogum Translationum et Commentariorum: Medieval and Renaissance Translations and Commentaries*, 9 vols., Washington, Catholic University of America, 1960-, IV, pp. 297-422, especially 372, 384-386.

on the earlier commentary on book two of Jakob Ziegler, first published at Basle in 1531, but he displayed a greater interest in comets than Ziegler had done.¹⁶ Thus, his substantial discussion of chapter 25 addressed the many things about the nature of comets that «rightly amazed learned men»: whether they should be considered stars rather than meteors; why, if the latter, they appeared less frequently than other such phenomena; whence they signified; and how, in particular, they were able to signify changes in human affairs if their own causes were physical.¹⁷ Milich acknowledged the difficulty of these questions, especially the last, but he argued that while the stars were among the causes of comets, they too signified future events, though «moved by a certain order and law of nature» – all of which went to show that the nature of things had been «established by some eternal mind, which has appointed very many things for signifying what will be».¹⁸ Similarly, Caspar Peucer, in his *Commentarius de praecipuis divinationum generibus*, published at Wittenberg in 1553, singled out cometary divination, along with astrological prognostication, as one of the few licit kinds based on a proper understanding of the natural order established by God.¹⁹ These and other works by Melancthon's associates show a strong interdependence, later texts explicitly citing the earlier ones.²⁰ Long before the appearance of the *nova* of 1572 and comet of 1577, therefore, Lutheran scholars were primed to understand comets as natural but also providential signs of a divinely-ordered world.

History provided the essential empirical evidence in support of this view, and was effectively marshalled to that end by Philippist commentators. Milich, for example, having pointed readers in the direction of Giovanni Pontano's commentary on ps.-Ptolemy's *Centiloquium* for examples of the comets of his age, gave a brief account of those that had appeared more recently, along with their concomitant events.²¹ And both of Camerarius's works

¹⁶ JAKOB ZIEGLER, *In C. Plinii de naturali historia librum secundum commentarius quo difficultates Plinianae, praesertim astronomicae, omnes tolluntur*, Basle, H. Petrus, 1531; NAUERT, *C. Plinius Secundus (Naturalis Historia)* (cit. note 15), pp. 375-378, 384.

¹⁷ MILICH, *Liber II C. Plinii* (cit. note 14), pp. 86v-96r, especially 88r: «Multa concurrunt in natura Cometarum, quae iure mirantur homines eruditi, & inquirenda putaverunt».

¹⁸ *Ivi*, p. 91r: «illae ipsae stellae certa lege naturae atque ordine moventur [...] hanc naturam rerum ab aliqua aeterna mente conditam esse, quae destinavit pleraque ad significanda futura».

¹⁹ CASPAR PEUCER, *Commentarius de praecipuis divinationum generibus*, Wittenberg, Johannes Crato, 1553, pp. 235v-257v.

²⁰ See, for example, Milich's citation of Camerarius's *Norica*, in *Liber II C. Plinii* (cit. note 14), p. 96r, and Peucer's citation of Camerarius in *Commentarius de praecipuis divinationum generibus* (cit. note 19), p. 250v.

²¹ MILICH, *Liber II C. Plinii* (cit. note 14), pp. 94v-95r; see GIOVANNI PONTANO, *Commentationes Super Centum Sententiis Ptolemaei*, Naples, Ex officina Sigismundi Mayr, 1512, sig. K6r-K6v.

– the *Norica* and the *De eorum qui cometae appellantur, nominibus, natura, caussis, significatione* – contained accounts of the notable events that attended earlier appearances; indeed, Camerarius emphasised the importance of such narratives in the later work, to which he gave the subtitle *cum historiarum memorabilium illustribus exemplis*. It is greatly advantageous, he wrote, «to have to hand those things which have occurred at other times, following the signs and prodigies of portents and omens and displays» – the better of course, to be forewarned and to see God’s providence at work in their operation – and the bulk of the text, was ostensibly devoted to meeting that need.²² The examples Camerarius supplied in 1558 were chronologically ordered, but incomplete and otherwise rather unsystematically presented. He began with «those things which are reported to have afflicted Greece when that comet which Aristotle called ‘great’ appeared» and he closed with consideration of «this recent sight of a comet, which we have just seen, not yet having observed the reason of its motion and what is being or will be brought about by it».²³ In between, across eighty pages of text untroubled by paragraph breaks, chapters, or subheadings, he discussed a number of other examples, few of them dated. Thus his text contained many cometary *historiae*, but these were not organised in the form of a cometary catalogue.

By the time Camerarius’s later work appeared, however, what may have been the earliest such catalogue had already been issued. Indeed, the *Cometographia* of the French physician Antoine Mizauld (1510-1578), published at Paris in 1549, included not one but two listings of comets through the centuries, with their attendant events.²⁴ The first of these again had its origins in the work of a close colleague of Melanchthon. As its apologetic dedicatory letter to the Wittenberg professor Paul Eber (1511-1569) explained, it came from notes on Eber’s 1544 lectures on book two of Pliny’s *Natural History* that had supposedly been conveyed to Paris by an (anonymous) former student

²² CAMERARIUS, *De eorum qui cometae appellantur* (cit. note 12), p. 18: «magnopere prodest [...] habere in promptu, quae aliis temporibus acciderunt, secuta portentorum ostentorumque & monstrorum signa atque prodigia».

²³ *Ivi*, p. 25: «ORDIEMUR autem expositionem ab iis quae narrantur eo tempore afflixisse Graeciam, quo ille Cometes apparuit, quem Aristoteles Magnum vocat»; p. 105: «de hac recenter specie Cometae, quem modo vidimus nondum observata ratione motus, & quid illo fiat futurumve sit».

²⁴ ANTOINE MIZAULD, *Cometographia: crinitarum stellarum quas mundus nunquam impune vidit, aliorumque ignitorum aëris Phaenomenon, naturam & portenta duobus libris philosophice iuxta ac astronomice expediens*, Paris, Christianus Wechelus, 1549. On Mizauld’s astrology, see JEAN-CLAUDE MARGOLIN, *Ordre cosmique et recherches causales dans la pensée astrologique d’Antoine Mizauld*, in ANNIE CAZENAVE – JEAN-FRANÇOIS LYOTARD (eds.), *L’art des confins: Mélanges offerts à Maurice de Gandillac*, Paris, Presses Universitaires de France, 1985, pp. 343-363.

and shown to Mizauld; he then insisted on printing them, despite the student's concerns about the propriety of doing so, the regularity of his attendance, and the accuracy of his record.²⁵ The second catalogue was a supplement to the first, prepared by Mizauld himself, and added 24 comets, more or less, to the 46 enumerated by Eber.²⁶ A third addition to the text, also by Mizauld, provided the details of other fires in the sky that had been witnessed since the second century AD.²⁷

The purpose of these lists is readily apparent from the entries themselves. Here, for example, is one of Eber's comets, number 38: «I found in the year 1457 another comet recorded as having begun to shine in the month of June, in the twentieth degree of Pisces, of that kind of comets which they call *Nigros* –²⁸ and there soon followed a motion of the Earth which opened a chasm in the mountains at Lake Garda, and afterwards a lengthy pestilence laid waste. This, if it is not the same as the previous one [comet 37], also signified the amazing success and victory of the Muslims against the Christians. In the following year occurred the death of Alfonso, which involved many towns of Italy in a long and serious war. This Pontano described well». ²⁹ And here, for comparison, is Mizauld's number 12: «In the year 1066, a comet was visible throughout Easter week. [...] Through the passing decrees of this comet, Rome was besieged by Frederick, whose army was almost completely wiped out by pestilence: and William the Bastard, Count of the Normans, crossed to England with the French, where he annihilated Harold with many English soldiers, and ruled in England for twenty-six years. Pope Alexander II died». ³⁰ Though Mizauld's chronology is a little confused – Frederick Barba-

²⁵ MIZAULD, *Cometographia* (cit. note 24), pp. 209-212; the catalogue occupies pp. 214-234.

²⁶ *Ivi*, pp. 235-247. There are 24 numbered comets in Mizauld's catalogue, but some of these overlap with Eber's.

²⁷ *Ivi*, pp. 248-258.

²⁸ A nine-fold typology of comets erroneously attributed to Ptolemy, of which «Niger» was the ninth and last category, enjoyed considerable authority during the later middle ages and early modern period; see THORNDIKE (ed.), *Latin Treatises on Comets* (cit. note 8), pp. 6, 24-25.

²⁹ MIZAULD, *Cometographia* (cit. note 24), pp. 228-229: «Anno 1457 annotatum invenio alium Cometam mense Iunio fulgere cepisse in vicesimo gradu Piscium, ex eo Cometarum genere quos *Nigros* vocant, & secutum mox terrae motum, qui montes ad lacum Benacum hiatu aperuerit, & grassatam esse postea pestilentiam diuturniorem. Hic si non est idem cum praecedente, significat & ipse Mahometis mirabiles successus ac victorias contra Christianos. In annum sequentem Alphonsi mors cadit, quae multas Italiae urbes longo, & gravi bello implicuit. Quod eleganter descripsit Pontanus».

³⁰ *Ivi*, pp. 239-249: «Anno 1066, Cometes in tota Paschali hebdomade apparuit... Per Cometae huius labentia decreta, Roma a Friderico obsidetur, cuius exercitus pestilentia totus pene absumitur: & Gulielmus nothus Northmanorum Comes cum Francis in Angliam traicit, ubi dicto Anglis praelio Araldum cum multis milibus perimit, & in Anglia annis sex & viginti regnat. Alexander 2. Rom. Pont. moritur».

rossa's attack on Rome occurred, and was thwarted by epidemic disease, a century later – the message is not: every past instance of a comet could readily be associated with particular ill effects.

The point – and the moral – was hammered home in closing statements to the catalogues. Having listed five comets seen between 1531 and 1539, Eber – if the words were indeed his – declared that he could hardly believe that the evils had been experienced of «so many prodigies, seen in such short a span of time».³¹ He would rather think, he declared, that they signified a universal alteration that God had mercifully deferred, allowing time for penitence and for the strengthening of the fragile Church by the Lamb of God. «Certainly, from these examples which I have adduced», he wrote, «it has been shown that the fires of comets and other prodigies have preceded all the great alterations and calamities of the world».³² Mizauld echoed the theme at the end of his catalogue of other fires in the sky:

These are things, good reader, which it has seemed fitting to gather here for you from various histories. When you dwell on them, seize the great goodness (I beseech you), of the most wise and immortal God, who makes his ministers (as the Apostle wrote to the Hebrews) a flame of fire; and from the signs hung on high, doubtless so that they can be seen by all, fails to warn no-one of his preordained wrath. Unless we placate which by prayers, lamentation, and emendation of our ways, certain evils from the sign provided shall fall on our necks – we believe this as certainly as it is certain that those things which have been written here have certainly occurred. Therefore now, at last (I think), you shall be persuaded that burning signs of the air are not at all empty.³³

The history of past portents was used to demonstrate that portents predict.

The work to which these catalogues were appended is itself an important example of sixteenth-century cometological writing. Though quickly passed over by C. Doris Hellman in her influential study on the comet of 1577, on

³¹ *Ivi*, p. 233: «tot prodigiis tam exiguo intervallo temporis conspectis».

³² *Ivi*, p. 234: «Certe his exemplis, quae adduxi ostensum est, maximas quasque mutationes ac calamitates mundi praecessisse Cometarum incendia & alia prodigia».

³³ *Ivi*, p. 257: «Haec sunt, optime Lector, quae ex variis historiis hic tibi colligere visum fuit. In quibus dum versaris, sapientissimi & immortalis Dei summam (quaeso) bonitatem suspice: qui ministros suos (ut Hebraeis scripsit Apostolus) flammam ignis facit: et de ostentis in sublime appensis, nimirum ut ab omnibus videri possint, neminem paratissimae suae irae non admonet: quam nisi precibus, planctu & morum emendatione placuerimus, certa mala dato signo cervicibus nostris imminere tam certo credamus, quam quae hic scripta sunt, certissime contigisse certum est. Itaque nunc demum tibi (opinor) persuadebis ignita aëris ostenta neutiquam vana esse».

the grounds that it added nothing *new* to the period's knowledge of comets,³⁴ Mizauld's *Cometographia* was in fact a comprehensive and systematic treatment of *existing* natural philosophical and astrological lore. It promised, on its titlepage, to treat comets and other «fires in the sky» in two books, philosophically and astronomically, and to demonstrate and prove what it had to say about the nature and portentousness of the phenomena from the «various observations of past ages and the histories of kingdoms and peoples».³⁵ *Historia* was a frequently occurring refrain in the printed marginalia which guided readers through the text. Thus in chapter thirteen of book one, on the motion of comets, Mizauld introduced a «most apposite history», taken once again from Pontano's commentary on the *Centiloquium*, to illustrate his point.³⁶ In chapter ten of the second book, devoted to explicating what comets portended according to their position in the zodiac, the marginal notes announce histories of Arian comets, Taurean comets, Geminian comets – and so on, for each of the twelve signs.³⁷ And in chapter eleven, which explores the significance of comets according to their planetary relationship, as indicated primarily by colour, the margins likewise draw attention to histories of Saturnine, Jovial, and Martial comets, and the like.³⁸ Thus, as an example of a lunar comet Mizauld cited that which had been seen in parts of Italy in the year 1515, or thereabouts, under the Pontificate of Leo X, after which «and the conjunction of its 'parent' planets there followed a great disturbance, perversion, and corruption of Christian things and so of the Church. Of the other significations, besides those listed, they also ascribe to it sterility and the swiftest of wars. In addition, head-colds, palsies, dropsy, epilepsy, the itch, blockages, neck pains, diarrhoea, looseness of the bowels, quotidian fevers, mange, leprosy, elephantiasis and other diseases of this kind».³⁹ In the body of the work itself, therefore, and not just in the appended catalogues, past observations of comets and associated events, clearly labelled as *historia*, pro-

³⁴ C. DORIS HELLMAN, *The Comet of 1577: Its Place in the History of Astronomy*, New York, Columbia University Press, 1944, pp. 104-105.

³⁵ MIZAUD, *Cometographia* (cit. note 24), sig. A1r: «Cometographia [...] philosophice iuxta astronomice expediens: & de variis praetitorum saeculorum observationibus, gentiumque ac regnorum historiis accurate demonstrans & confirmans».

³⁶ *Ivi*, p. 75: «Historia perapposita»; «Historia Iovianus rem eam hunc in modum illustrat».

³⁷ *Ivi*, pp. 161-176.

³⁸ *Ivi*, pp. 176-194.

³⁹ *Ivi*, pp. 192-193: «parentum planetarum congressum, magna rerum Christianarum atque adeo ecclesiae tumultuatio, depravatio, & corruptela sequuta est. Caeterum praeter connumerata eidem etiam adscribunt sterilitatis & levissimorum bellorum significaciones. Insuper catarrhos, paralyses, hydropas, epilepsias, scabies, obstructiones, coli dolores, diarrhaeam, lienteriam, quotidianas febres, psoram, lepram, elephantiasim & huius generis morbos alios».

vided the empirical evidence. But the main text went further than the catalogues in exploring the astrological theory which could be used, in principle, to prognosticate on the basis of any new cometary appearance.

Subsequent cometological texts continued to stress the value of cometary *historiae*, and to provide them in the form of further chronological catalogues. Many of these, but by no means all, were produced by Lutherans. Thus, after being amazed by the comet of 1556, the Swiss Reformed theologian Ludwig Lavater (1527-1586) published one such listing, the *Cometarum omnium fere catalogus*, in which he favourably contrasted his comprehensive coverage of comets seen since the birth of Christ with the selective approach of Camerarius's *Norica*.⁴⁰ Benedikt Aretius (c. 1522-1574), Professor of Greek and Hebrew at the Berne Academy, who had been partly educated at Wittenberg, likewise listed historical comets in his *Brevis cometarum explicatio*, which appeared that same year: 72 in all, from those discussed by Aristotle in the *Meteorology* to the one just seen.⁴¹ These were presented as examples illustrative of the preceding analysis of «what a comet is», a causal account of the phenomena in scholastic terms, which itself followed a learned discussion of nine categories of ancient opinion that combined Aristotle's survey of *endoxa*, the learned opinions of his predecessors, with Seneca's account, and also cited Plutarch, Pliny, and Galen.⁴² Aretius associated the comet of 1556 with dry weather, avalanches, and a pestilence afflicting local cattle, but like earlier writers he piously declined to predict events yet to come and concluded by noting that such phenomena were inducements to repent.⁴³ Peucer's student Johannes Garcaeus (1530-1574) included lists of historical examples of each of the kinds of phenomena considered in his *Meteorologia* of 1568.⁴⁴ His catalogue, containing fifty comets and their concomitants, began with the one that portended the defeat of Xerxes I by Themistocles in the naval battle of the straits of Salamis in 480 BC, the

⁴⁰ LUDWIG LAVATER, *Cometarum omnium fere catalogus, qui ab Augusto, quo imperante Christus natus est, usque ad hunc 1556. annum apparuerunt, ex variis historicis collectus*, Zurich, Andreas Gesner and Iacobus Gesner, 1556, sig. A2r-A2v.

⁴¹ BENEDIKT ARETIUS, *Brevis Cometarum Explicatio physicum ordinem & exempla historiarum praecipua complectens*, Berne, Samuel Apiarius, 1556, sig. c2v-f3v.

⁴² *Ivi*, sig. b3v-c2r: «Quid sit Cometa»; sig. b[1]v-b3v: «Sententiae aliquot veterum de Cometis». On the *endoxa*, see LIBA TAUB, *Ancient Meteorology*, London, Routledge, 2003, pp. 93-94.

⁴³ ARETIUS, *Brevis Cometarum Explicatio* (cit. note 41), sig. f3v-f4r.

⁴⁴ JOHANNES GARCAEUS, *Meteorologia. Addita sunt tabellae, quae totam meteororum doctrinam complectuntur, et exempla sacra et prophana, multorum seculorum, quibus haec materia scholasticorum causa illustrata est*, Wittenberg, Iohan Schwertel, 1568.

unseemly flight of the Persian King from the Greek peninsula, and the subsequent massacre of the Persians left behind under the command of Mardonius at the battle of Plataea the following year.⁴⁵ It closed with the comets of 1556 and 1558, whose significance was, once again, said to be still being experienced.⁴⁶ And the Catholic Theodorus Graminaeus (c. 1540-1596), *mathematicus ordinarius* at Cologne, incorporated a catalogue of comets and events into his German work on the nova of 1572, which he took to be another example of the phenomena.⁴⁷ This ran from 642 BC – the date he erroneously gave to the ‘great comet’ described by Aristotle – to 1556.⁴⁸

The comet of 1577 inspired similar efforts. The treatise of Johannes Praetorius (1537-1616), *De cometis qui antea visa sunt et de eo qui novissime mense Novembri apparuit, narratio*, published at Nuremberg in 1578, has recently attracted attention from historians of astronomy as the means by which Tycho Brahe became acquainted, albeit inadequately, with the optical arguments of Pena against the existence of the celestial spheres.⁴⁹ But Praetorius’s work also included a catalogue of comets and associated events, described as histories, which took as its starting point the opinions of philosophers and ancients about the phenomena, and which mentioned as one source of inspiration the cometary writing of Praetorius’s teacher, Joachim Camerarius.⁵⁰ Georg Caesius (1542-1604), the Lutheran pastor of nearby Leutershausen, produced a *Catalogus, nunquam antea visus, omnium cometarum secundum seriem annorum a diluvio conspекtorum, usque ad hunc praesentem*, which was published, again at Nuremberg, the following year.⁵¹ As its titlepage advertised, the comets were listed «with notes of their portents or events, and of the effects of comets in each sign of the zodiac: from which the wise

⁴⁵ *Ivi*, p. 36r.

⁴⁶ *Ivi*, pp. 52r-52v.

⁴⁷ THEODORUS GRAMINAEUS, *Erklärung oder Auslegung eines Cometen, so nuhn ein gutte zeit, von Martini des nechst vergangenen Jars, bisz auff den dritten Februarii dieses jetzt lauffenden MDLXXII Jars am himmel vernommen und noch bey nachstlicher zeit gesehen wirdt*, Cologne, no printer given, 1573. On Graminaeus, see RIENK VERMIJ, *Theodorus Graminaeus. Een wiskundige in dienst van de contrareformatie*, «Studium», 1 (2010), pp. 1-17.

⁴⁸ GRAMINAEUS, *Erklärung oder Auslegung eines Cometen* (cit. note 47), p. 33.

⁴⁹ See ADAM MOSLEY, *Bearing the Heavens: Tycho Brahe and the Astronomical Community of the Late Sixteenth Century*, Cambridge, Cambridge University Press, 2007, pp. 76-77, and the literature there cited.

⁵⁰ JOHANNES PRAETORIUS, *De cometis qui antea visa sunt et de eo qui novissime mense Novembri apparuit, narratio*, Nuremberg, Catharinae Gerlachin & Haeredum Iohannis Montani, 1578, sig. A2v-B4r, especially A2v-A3r.

⁵¹ GEORG CAESIUS, *Catalogus, nunquam antea visus, omnium cometarum secundum seriem annorum a diluvio conspекtorum, usque ad hunc praesentem*, Nuremberg, Valentinus Furmannus, 1579.

reader afterwards can readily judge concerning any comet»; the information had been gathered «from the many writings of historians, philosophers and astronomers [...] with much labour and by a most careful search».⁵²

The genre lived on into the seventeenth century. In 1602, Abraham Rockenbach (1536-1611), a professor of law at then-Lutheran Frankfurt-an-der-Oder (but previously of mathematics and Greek, and still Dean of Philosophy), published *De cometis, tractatus novus methodicus*, a work squarely in the scholastic tradition. Chapters were devoted to the definition of comets; an account of their parts and species; their material, efficient, formal, and final causes; and the concomitant phenomena which, Rockenbach argued, were indeed their effects.⁵³ Rockenbach's methodical approach encompassed «examples of comets collected from ancient and modern histories», which supported his assertion that it was a matter of historical consensus that «comets are always followed by public disasters».⁵⁴ The first comet he listed had, he claimed, appeared in Pisces in the time of Noah, and was immediately followed by the Flood.⁵⁵ The Wittenberg and Tübingen alumnus Elias Ehinger (1573-1653), Rector of the Augsburg Gymnasium, published a *Cometen Historia* that stretched from the reign of Augustus to the comet seen in the year of publication, 1618.⁵⁶ Gotthard Arthus (1570-c. 1630), the Jena-educated Rector of the school at Frankfurt am Main, promised, on the titlepage of his *Cometa Orientalis* of 1619, to explain the significance of the most recent comet on the basis of true astrological and *historical* grounds – and the latter took the form of a brief catalogue of comets, and their attendant events, from the one described by Claudian onwards.⁵⁷ As in the preceding century, some

⁵² *Ivi*, sig. Ar: «cum portentis seu eventuum annotationibus, & de Cometarum in singulis Zodiaci signis, effectibus: ex quibus prudens lector posthac facillime de quovis Cometa iudicare poterit, &c ex multorum Historicorum, Philosophorum & Astronomorum [...] scriptis [...] plurimo labore & diligentissima inquisitione collectus».

⁵³ ABRAHAM ROCKENBACH, *De cometis, tractus novus methodicus*, Wittenberg, Ex officina Cratonis, 1602, pp. 27-75.

⁵⁴ *Ivi*, p. 27: «exempla Cometarum, collecta ex antiquis & recentibus historicis»; p. 62: «omnium historiarum consensu constat, Cometas semper calamitates publicas sequi solere». The catalogue itself runs from pp. 113 to 236.

⁵⁵ *Ivi*, p. 114.

⁵⁶ ELIAS EHINGER, *Cometen Historia. Das ist: Kurtze Beschreibung der fürnembsten Cometen so von der Regierung an deß Römischen Kayzers Augusti und der gnadenreichen Geburt unsers Herrn und Heylands Jesu Christi innerhalb 1618. Jahren sein gesehen worden. Auss den Historicis kurtz und Summarischer weiß zusammen getragen unnd verteutschet*, Augsburg, Johann Schultes, 1618.

⁵⁷ GOTTHARD ARTHUS, *Cometa Orientalis, Kurtze und eygentliche Beschreibung dess neuen Cometen so im November dess abgelauffenen 1618. Jahrs in Orient oder gegen Auffgang der Sonnenen allhie erschienen und von menniglich gesehen worden*, Frankfurt am Main, Sigismund Latomus, 1619,

cometary catalogues appeared as part of works dealing with a wider range of natural and social phenomena. Heinrich Eckstorm (1557-1622), who had studied at Wittenberg, Jena, and Leipzig, and was Rector of the Lutheran School at Walkenried, published a *Historiae Eclipsium, Cometarum et Pareliorum* at Helmstedt in 1621, in which each type of phenomenon – and their associated events – was treated in a separate section of the work. His catalogue of comets likewise began with the one which had reputedly appeared in Pisces in the time of Noah, and ended with those of 1618.⁵⁸ And the Calvinist encyclopaedist, Johann Heinrich Alsted (1588-1638), included a table of comets and associated events in his immense *Thesaurus Chronologiae* of 1624, which also included a chronology of eclipses and other astronomical observations, and one of great conjunctions.⁵⁹

Already by the later sixteenth century it was possible to cull the information required to produce such catalogues from existing examples, or from more general compilations such as the *Prodigiorum ac ostentorum chronicon* of 1557 of Conrad Lycosthenes (1518-1561), which listed signs and prodigies of all kinds in chronological order, or the *Histoires Prodigieuses* of 1560 of Pierre Boaistuau (c. 1500-1566), which devoted a single chapter to «diverse figures, Cometes, Dragones, flambeaux, qui sont apparez au ciel». ⁶⁰ Thus Giovanni Battista Riccioli (1598-1671), whose detailed *historia cometarum* in the *Almagestum novum* (1651-1655) still conformed

sig. Ar: «Auss warhafften Astrologischen und Historischen Gründen meniglich zur Nachrichtung gestellt».

⁵⁸ HEINRICH ECKSTORM, *Historiae Eclipsium, Cometarum et Pareliorum, mediocri copia ex optima notae tam antiquis quam recentibus Scriptoribus collectae*, Helmstedt, heredum Iacobi Lucy, 1621, pp. 202-285.

⁵⁹ JOHANN HEINRICH ALSTED, *Thesaurus Chronologiae. In quo Universa temporum & historiarum series in omni vitae genere ponitur ob oculos*, Herborn, no printer given, 1624, pp. 321-323, 323-327, 327-336. On this work see HOWARD HOTSON, *Paradise Postponed: Johann Heinrich Alsted and the Birth of Calvinist Millenarianism*, Dordrecht, Kluwer, 2000, pp. 29-39. The list of cometary catalogues that I provide here is not exhaustive; WOLFGANG KOKOTT, *Die Kometen der Jahre 1531 bis 1539 und ihre Bedeutung für die späterer Entwicklung der Kometenforschung*, Diepholz, GNT Verlag, 1994, pp. 154-158, following Pingré and Ernst Zinner, discusses some that I have not been able to consult, and the genre was not entirely confined to the German-speaking lands. For a (rare) Italian example, Giuseppe Rosaccio's *Discorso di Giosepe Rosaccio sopra l'apparire delle comette; nel quale si tratta breuemente: della Natituità di Christo Salvatore nostro: sino all'anno 1608. Quante comete, et altri stupendissimi segni siano apparsi: et quanto sia dopo successo*, Bologna, Bartolomeo Cochi, 1608, see ELIDE CASALI, *Astrologia 'cristiana' e nuova scienza. Pronostici astrologici sulle comete (1577-1618)*, in this volume.

⁶⁰ CONRAD LYCOSTHENES, *Prodigiorum ac Ostentorum Chronicon, quae praeter naturae ordinem, motum, et operationem, et in superioribus & his inferioribus mundi regionibus, ab exordio mundi usque ad haec nostra tempora acciderunt*, Basle, Heinrich Petri, 1557; PIERRE BOAISTUAU, *Histoire Prodigieuses les plus memorables qui ayent esté observées, depuis la Nativité de Iesus Christ, usques à nostre siecle*, Paris, Annet Briere, 1560, pp. 66-72.

to the model of his predecessors, listing both comets and the terrible storms, wars, deaths and diseases that accompanied them, would have had no need to look beyond the astronomical and meteorological authors he was citing in any case to generate his catalogue.⁶¹ But the production of these lists did, at some point, entail serious historical work, as writers scoured ancient texts, medieval chronicles, and more contemporary publications – historical, astronomical, and philosophical – for notices of comets and the events that attended them. Eber and Mizauld were less assiduous than some in recording their sources in their catalogues, but certainly made use of Plutarch's *Lives*, the *Bibliotheca historica* of Diodorus Siculus, the *Chronicon sive Chronographia* of Sigebert of Gembloux (c. 1030-1112), Matteo Palmieri's fifteenth-century continuation to the chronicle of Eusebius (1483), Pontano's verse *Meteora* (which Melanchthon had introduced in an edition of 1524) as well as his commentary on the pseudo-Ptolemaic *Centiloquium*, one or more of Apian's comet texts, including the *Astronomicum Caesareum* (1540), and the twelfth-century astrological work by John of Seville which had been edited by Joachim Heller (1519-1590) as the *Epitome totius astrologiae* (1548). Ludwig Lavater was more diligent: besides such familiar cometological authors as Aristotle, Ptolemy, Pliny, Seneca, and Pontano, his sources ranged from Virgil's *Georgics* and Lucan's *Pharsalia* – via the *Etymologies* of Isidore of Seville (c. 560-636), the *Epitome* of Cassius Dio's *Roman History* prepared by Joannes Xiphilinus (fl. 1070), the *Chronicon* of Hermannus Contractus (1013-1054), and the thirteenth-century *Chronicon Abbatis Urspergensis* – to the Nuremberg Chronicle (1496), the *Enneades* (1504) of Marco Antonio Sabellico (1436-1506), the posthumously published world-chronicle of Johannes Naucler (c. 1425-1510) that had appeared in 1516, the *Chronicon Carionis* (1532) by Johannes Carion (1499-1538) and Melanchthon, the *Chronologia* (1545) of Johannes Funck (1518-1566), and the *Schwytzer Chronica* (1554) of Johannes Stumpf (1500-c. 1576). Unsurprisingly, perhaps, Lavater was certain that he had not overcome the difficulties presented by so many discrepant accounts, written by authors who did not always provide adequate details concerning the place, time, and duration of the phenomena. Inclusion of a single comet multiple times was, he thought, the inevitable result.⁶²

⁶¹ GIOVANNI BATTISTA RICCIOLI, *Almagestum novum*, 2 vols., Bologna, ex typographia haereditis Victorii Benatii, 1651-1655, 2 vols., II, pp. 1-40, especially 3: «Caput III. Historia Cometarum 154. Chronologica & Astronomica. Cum eventibus, qui Cometis tanquam causis aut signis attribuis consuevere ab aliis, potius quam a nobis».

⁶² LAVATER, *Cometarum omnium fere catalogus* (cit. note 40), sig. A2v.

Georg Caesius, for his part, noted in his *Catalogus* of 1579 that, besides the *Cometographia* of Mizauld, to which Paul Eber's list of comets was appended, many comets could be found in the

Chronica of our common *praeceptor* Philip Melancthon, of blessed memory, in the writings of the most learned Camerarius and Peucer, and in the *Chronologia* of Funck, as well as in the little book of the mathematician Cyprian [Leowitz] about the great conjunctions of the superior planets, etc. – also in the books of Aretius, Garcaeus and other learned men (who took them from Aristotle, Pliny, Seneca, Suetonius, Plutarch, Ptolemy, Pontano, Regiomontanus, Naucler, Sabellico, Palmieri, and as many other historians as possible).⁶³

Caesius presented his familiarity with the wealth of existing sources as a virtue: his work contained an ordered compilation of comets as described in a multitude of texts, not all of them in print, which others would surely lack the time and resources to produce.⁶⁴

Much of the historical labour that enabled the production of cometary catalogues was not, of course, initially or primarily concerned with explicating such phenomena. As previously noted, ancient and medieval writers on comets had cited examples, usually ones that they themselves or their near contemporaries had seen, or that were discussed in the earlier cometological writings on which they drew. And medieval chroniclers and annalists had indeed taken notice of comets, often explicitly invoking their portentous status and connecting them to notable events that followed closely upon their appearance. But what made it possible for sixteenth- and seventeenth-century authors to fully exploit such resources, so as to dramatically extend the range of comets they referred to, was the potent combination of an increasing historical consciousness with the reproductive power of print. The publication of existing histories and chronicles, and the composition of new ones, served, and was fed by, the needs of multiple audiences and interests: humanists' fascination with the literary monuments of Antiquity; antiquarians' and numismatists' inquiries into the material remains of the past; monarchs' desire to establish distinguished genealogies for themselves; citizens' of various nations concern to do likewise for their homeland; and ecclesiologists' overwhelming

⁶³ CAESIUS, *Catalogus* (cit. note 51), sig. A2v: «plerosque, Cometas in Chronicis communis nostri Praeceptoris Philippi Melanthonis sanctae memoriae, & doctissimorum Camerarii & Peuceri scriptis, atque in Chronologi Funccii, sicut etiam in Cypriani Mathematici libello de coniunctionibus magnis superiorum Planetarum &c. Item in Aretii, Garcaei & aliorum doctorum virorum (qui eosdem ex Aristotele, Plinio, Seneca, Suetonio, Plutarcho, Ptolemaeo, Regiomontano, Nauclero, Sabellico, Palmerio, & ex aliis quam plurimis historicis habent), libris[...]».

⁶⁴ *Ivi*, sig. A3r.

need to do the same for their faith. And, to be sure, many historiographers and chroniclers strove to demonstrate the unfolding of a providential plan through the history of the world, and often looked anxiously towards its end.⁶⁵ For some, astrology indeed functioned as a «naturalistic theology of history», to use the words of Krzysztof Pomian; they saw great conjunctions, eclipses and comets as intermediaries in the divine causal chain which worked great terrestrial change and transformations of human affairs.⁶⁶

Some of the producers of cometary catalogues were directly involved in the production of other historical works which expressed and shaped these views. Paul Eber, for example, published a vast *Calendarium Historicum* (1550), which provided Lutherans with a safe alternative to a Catholic calendar crowded with saints. It offered biblical, classical, and modern examples of great men and events for each day; facilitated the drawing up of nativities of famous men through the inclusion of precise birth times and dates; and afforded much empty space via which owners could write themselves, or their contemporaries, into the pages of history.⁶⁷ Gotthard Arthus is better known for his eschatological chronicling of contemporary events in the four-volume *Commentariorum de rebus in Regno Antichristi* (1609-1625), and for his continuation of the Reformation history of Johann Sleidan (1506-1556), in the already-extended version by Michael Beuther (1522-1587), the *Sleidanus Redivivus*, published in 1618.⁶⁸

⁶⁵ The literature on this topic is vast, but see, for a selection, GERALD STRAUSS, *The Search for the German Past*, in his *Sixteenth-Century Germany: Its Topography and Topographers*, Madison, University of Wisconsin Press, 1959, pp. 29-44; CONSTANTINOS A. PATRIDES, *The Grand Design of God: The Literary Form of the Christian View of History*, London, Routledge & Kegan Paul, 1972; ROBIN BRUCE BARNES, *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation*, Stanford, Stanford University Press, 1988, especially pp. 100-140; ARNALDO MOMIGLIANO, *The Classical Foundations of Modern Historiography*, Berkeley and Los Angeles, University of California Press, 1990; ALAIN SCHNAPP, *The Discovery of the Past: The Origins of Archaeology*, London, British Museum Press, 1996, especially pp. 121-177; DONALD R. KELLEY, *Faces of History: Historical Inquiry from Herodotus to Herder*, New Haven, Yale University Press, 1998, especially 162-187; CUNNINGHAM – GRELL, *The Four Horsemen of the Apocalypse: Religion, War, Famine, and Death in Reformation Europe*, Cambridge, Cambridge University Press, 2000, especially pp. 1-18; IRENA BACKUS, *Historical Method and Confessional Identity in the Era of the Reformation (1378-1615)*, Leiden, Brill, 2003; ANTHONY GRAFTON, *What was History? The Art of History in Early Modern Europe*, Cambridge, Cambridge University Press, 2007; BEN-TOV ASAPH, *Lutheran Humanists and Greek Antiquity: Melanchthonian Scholarship between Universal History and Pedagogy*, Leiden, Brill, 2010.

⁶⁶ KRZYSZTOF POMIAN, *Astrology as a Naturalistic Theology of History*, in PAOLA ZAMBELLI (ed.), *Astrologi Hallucinati: Stars and the End of the World in Luther's Time*, Berlin and New York, Walter de Gruyter, 1986, pp. 29-43.

⁶⁷ PAUL EBER, *Calendarium Historicum*, Wittenberg, haeredes Georgii Rhau, 1550; see, on this work, MAX ENGAMMARE, *On Time, Punctuality, and Discipline in Early Modern Calvinism*, Cambridge, Cambridge University Press, 2009, pp. 148-149.

⁶⁸ ERNST KELCHNER, *Arthus, Gotthard*, in *Allgemeine Deutsche Biographie*, 56 vols., Berlin, Duncker & Humblot, 1967, vol. I, p. 613.

Authors such as these must have found it easy to pursue their related historical interests in parallel. More generally, however, the comet catalogues of the sixteenth and seventeenth centuries testify to the extent to which *historia*, as a mode of enquiry, cut across the modern boundary between the realms of the natural and the social.⁶⁹ Indeed, the very fact that the events supposedly portended by comets encompassed both natural and political disasters helps to suggest why scholarly concern with these and other subjects in the early modern period does not conform to our categories of disciplinary interest, which have been more tightly drawn in subsequent centuries.

COUNTER- AND CONTRA-HISTORIAE: DISSENTING *DE COMETIS DISSERTATIONES*

For those inclined to believe, therefore, ample historical evidence had been made available by the later sixteenth century in support of the inherited notion that comets, whether as signs or causes, signified future events. But not everyone was so inclined. In particular, not everyone was willing to accept the postulated connection between the natural phenomena of comets and political concomitants such as wars, insurrections, and rulers' deaths. This is not so surprising given that this relationship was already a problem for medieval scholars in the Aristotelian tradition, both Arab and Latin, and one that they themselves had to make strenuous efforts to overcome. In the early part of the sixteenth century, a number of authors expressed themselves dissatisfied with the theory to a greater or lesser extent. Thus Gregor Reisch, in his widely disseminated *Margarita philosophica* (1503), suggested that, although princes *might be* more delicate and intemperate than others, and hence more susceptible to comets or the conditions that caused them, it was also possible that they were simply more talked about than ordinary people.⁷⁰ In a work published in 1540, but composed some years earlier, Giovanni Ferrerio of Piedmont (1502-1579) argued against the interpretation of the comet of 1531 as an ill-omen for the reign of James V of Scotland. While accepting that comets might signify events appropriate to their nature, he doubted the existence of any natural relationship between comets and men, and denied that there was any such connection between comets and kings.⁷¹ However John Robins

⁶⁹ See, on this point, the introduction and essays in GIANNA POMATA – NANCY G. SIRAISS (eds.), *Historia: Empiricism and Erudition in Early Modern Europe*, Cambridge MA, MIT Press, 2005. On *historia* as an 'epistemic genre', cf. also the considerations by N. Jardine (p. 170) in this volume.

⁷⁰ CUNNINGHAM – KUSUKAWA (eds.), *Natural Philosophy Epitomised: Books 8-11 of Gregor Reisch's Philosophical Pearl (1503)*, Farnham, Ashgate, 2010, p. 127.

⁷¹ GIOVANNI FERRERIO, *De vera cometarum significatione, contra astrologorum omnium vanitatem*

(c. 1500-1558), in an undated manuscript treatment of comets as portents addressed to Henry VIII, expressed the more orthodox view that, while comets were not causes in their own right, but amongst the effects of such celestial causes as eclipses and the activity of hot and dry planets, the concomitant consequences for great men could be understood with reference to humoral theory.⁷²

A collection of cometological writings published at Basle in 1580, the *De cometis dissertationes*, suggests how those sceptical about cometary prognostication responded to the existence of *historiae* and catalogues that purported to demonstrate comets' value as portents.⁷³ The tracts in this collection have a complicated chronological and authorial relationship to one another: two of them had previously been published in an earlier form at Basle, in 1579, but several take the form of letters and must have circulated in manuscript.⁷⁴ Indeed, the formation of the collection as a whole seems to have been facilitated by the correspondence network of the Hungarian-born clergyman Andreas Dudith (1533-1589), although it was the Heidelberg physician Thomas Erastus (1524-1583) who apparently saw the work through the press.⁷⁵ The four authors of the six *dissertationes* did not entirely agree about what comets were. Thus the Italian exile, Marcello Squarzialupi (1538-1592) suggested in his *De cometa in universum, atque de illo qui anno 1577, visus est*, that comets were celestial rather than meteorological phenomena,⁷⁶ and thereby prompted a rebuttal from Erastus, the *De cometarum ortu, natura et causis tractatus*, which vigorously defended the Aristotelian account. Andreas Dudith, in his *De cometarum significatione*, a letter addressed to the imperial physician Johannes Crato von Crafftheim (1519-1585) also supported the scholastic inter-

libellus, Paris, Michaël Vascosanus, 1540; see THORNDIKE, *History of Magic and Experimental Science*, 8 vols., New York, Columbia University Press, 1923-1958, vol. V, pp. 294-295.

⁷² *Ivi*, vol. V, pp. 320-321; STEVEN A. WALTON, *Robins, John (c. 1500-1558)*, in LAWRENCE GOLDMAN (ed.), *Oxford Dictionary of National Biography*, online edn., Oxford, Oxford University Press, 2004 [<http://www.oxforddnb.com/view/article/23825> (accessed 7 September 2011)].

⁷³ *De cometis dissertationes novae Clariss. Virorum Thom. Erasti, Andr. Dudithii, Marc. Squarzialupi, Symon Grynaei*, [Basle], Leonard Ostenius, 1580; see HELLMAN, *The Comet of 1577* (cit. note 34), pp. 355-358, for a bibliographical description.

⁷⁴ See ANDREAS DUDITH, *De cometarum significatione commentariolus. In quo non minus eleganter, quam docte & vere, Mathematicorum quorundam in ea re vanitas refutatur. Addidimus T. Erasti eadem de re sententiam*, Basle, Petrus Pernam 1579.

⁷⁵ For Dudith's correspondence of this period, see LECHUS SZCZUCKI – NICOLAUS SZYMANKSI (eds.), *Andreas Dudithius Epistulae. Pars VI, 1577-1580*, Budapest, Akadémiai Kiadó, 2002. Erastus's letter to Dudith, dated 24 February 1580, acts as a preface to the work and contains an apology for the sequence adopted by the printer; see *De cometis dissertationes* (cit. note 73), *2r-*2v.

⁷⁶ *Ivi*, pp. 27-97, especially 47-62.

pretation, as did Simon Grynäus (1539-1580), Professor of Mathematics at Heidelberg, in his *Commentarii duo, de ignitis meteoris unus: alter de cometarum causis atque significationibus*. But despite this difference of opinion, the four contributors all agreed that commentators in the past and the present went far too far in treating comets as signs of specific future events.

The arguments of Erastus, who had form when it came to combating what he perceived to be the excesses of Philippist astrology, are easiest to follow.⁷⁷ Signs, he argued in the *De cometarum significationibus iudicium*, must either be natural – possessing some natural connection with the thing signified – or artificial, which is to say conventional. Natural signs could only be causes of the things signified, effects of them – as smoke was a sign of fire – or effects of a cause common to sign and signified alike.⁷⁸ Whilst accepting that comets, as meteorological phenomena, produced dry and hot air, Erastus denied that this air could result in wars, plagues, or the deaths of princes. Indeed, medical theory and experience indicated that, if anything, dry and hot air was beneficial to health and to harvests.⁷⁹ To the extent that disease and winds might result from the exhalations that supplied the matter for comets, they might occasionally indicate plagues and gales as effects of a common cause, but they functioned rather to consume such impurities.⁸⁰ And rather than being more susceptible to the evils associated with comets, kings and princes, who benefitted from defensible strongholds and prudent counsellors, were much less likely to be victims of either their passions or diseases than ordinary men.⁸¹ Comets, then, could not be natural causes of such evils; nor could they be effects, either of the events themselves or of a cause in common.⁸² So comets could not be natural signs of such future events.

That comets could not be artificial signs of their traditional concomitants Erastus demonstrated by the following argument. Artificial signs were of two varieties, human and divine. An example of a human artificial sign were the stones, or *termini*, used to indicate the boundaries of fields.⁸³ But humans

⁷⁷ CHARLES D. GUNNOE, *German Protestantism and Astrology: The Debate between Thomas Erastus and the Melanchthon Circle*, in KASPAR VON GREYERZ et al. (eds.), *Religion und Naturwissenschaften im 16. und 17. Jahrhundert*, Gütersloh, Gütersloher Verlaghaus, 2010, pp. 86-101, and ID., *Thomas Erastus and the Palatinate: A Renaissance Physician in the Second Reformation*, Leiden, Brill, 2010, especially pp. 42-48.

⁷⁸ *De cometis dissertationes* (cit. note 73), pp. 2-3.

⁷⁹ *Ivi*, p. 5.

⁸⁰ *Ivi*, p. 12.

⁸¹ *Ivi*, pp. 4-5.

⁸² *Ivi*, p. 19.

⁸³ *Ivi*, p. 3.

had no power to generate a comet and place it in the sky, so clearly the phenomenon was not a human sign.⁸⁴ Divine signs could be further subdivided into those with a particular significance revealed to man and those without. In the former category could be placed the rainbow, a sign of God's promise not to institute a second Flood.⁸⁵ But of things whose meanings God had *not* expressly revealed – comets, and other exceptions to the general course of nature – a particular indication could be determined by «no art, no reason, no method».⁸⁶ Comets could not, therefore, be considered divine signs of particular events.

Whereas Erastus based his objection to cometary divination on an Aristotelian conception of their nature, Squarcialupi relied rather on his rejection of the scholastic doctrine which others had used to justify their interpretation as signs. Combined with his equally fierce disdain for Ptolemaic and Arabic astrology, what had been problematic even with the inherited understanding of comets as fiery exhalations in the upper atmosphere was rendered, he implied, wholly unsupported without it, and he refused to accept even that comets might be causes or signs of dryness and winds.⁸⁷ As astrological authors, Ptolemy and Mizauld were particular targets of his ire.⁸⁸ He also criticised Camerarius and Peucer, and pointed out that scholars who wished to attribute significance to the figure of the comet of 1577 could not even agree on its shape.⁸⁹

All four contributors to the *De cometis* engaged with their opponents' reliance on cometary *historiae*, and made use of history themselves in a variety of ways. In his response to Squarcialupi, for example, Erastus used cometary histories positively, as evidence that comets were often followed by notable dryness and were frequently accompanied by other fiery meteors. For this purpose, he drew on authors already mentioned, such as Sleidan, Stumpf, Xiphilinus, and Palmieri, and on the *Ecclesiastical History* of Nicephorus Callistus (fl. 1320) and the *De rebus gestis Francorum* of Paulus Aemilius (1460-1529), who was citing Bede.⁹⁰ But he and the others also adduced counter-*historiae*, accounts of the appearances and non-appearances of comets which

⁸⁴ *Ivi*, p. 18.

⁸⁵ *Ivi*, p. 3.

⁸⁶ *Ivi*, p. 18: «Horum signorum peculiarem indicationem nulla arte, nulla ratione, nulla methodo cognoscere possumus».

⁸⁷ *Ivi*, pp. 29, 56.

⁸⁸ For example, *ivi*, pp. 32, 63.

⁸⁹ *Ivi*, pp. 35-39, 41-44.

⁹⁰ *Ivi*, pp. 134-136.

challenged their association with terrible events. Thus in the *De cometarum significationibus iudicium* he noted that some authors, such as Pliny, were prepared to accept the possibility that comets might signify good rather than evil events, naming in particular the «fortunate» comet of Augustus, since interpreted as a sign of Christ's birth and Christianity.⁹¹ He added further examples, such as the comets of 1097 and 1506, which had preceded bountiful summers, and the comets of 1556 and 1558, which had been followed by healthy hot and dry weather.⁹² And he provided a list of princes whose deaths had occurred since 1558 without being announced by any cometary appearance; these included «Emperor Charles V, Ferdinand his brother and successor, his son Maximilian, the king of Poland, two kings of France, the son of King Philip of Spain, the king of Scotland» and more.⁹³ (In the earlier version of his text, he also ridiculed those who took comets to be signs of wars planned and begun long before they had appeared).⁹⁴ Squarcialupi likewise referred to the «fortunate» comet of the age of Augustus, mocking the cometologist who dared to reverse the judgement of Pliny and decide, after the space of a millennium and a half, that it had actually been unlucky, simply to accommodate his theory.⁹⁵ Similarly, he noted that innumerable battles, uprisings, massacres, plagues and earthquakes had occurred without any comet being seen, giving among his small number of examples the massacre by Emperor Trajan of 40,000 men in Cyprus and Egypt, and the wars of religion that had been raging in France over the past twenty years.⁹⁶ Dudith referred to plagues recorded by Thucydides, Hippocrates, Galen, and Boccaccio, and in his own lifetime, as well as to wars waged, princes deceased, towns flooded and buildings damaged by earthquakes, all without the forewarning of a comet.⁹⁷ «But to bring to light almost innumerable evils of this kind, from the history of antiquity and of our times», he claimed, «would be nearly no trouble».⁹⁸ Remarks *contra* the reliance on history also accompanied these coun-

⁹¹ *Ivi*, p. 1.

⁹² *Ivi*, pp. 1, 5.

⁹³ *Ivi*, p. 6: «Anno 1558 Cometa nobis apparuit ultimus. Ab hoc tempore quot sunt mortui principes summi, quibus nullus praeluxit cometes? Primum Carolus Imperator, Ferdinandus eius frater & successor huius filius Maximilianus, Rex Poloniae, Reges duo Galliae, Rex Hispaniae Philippi filius, Rex Scotiae[...]».

⁹⁴ *Ivi*, p. 65.

⁹⁵ *Ivi*, p. 74.

⁹⁶ *Ivi*, p. 68.

⁹⁷ *Ivi*, pp. 172-176.

⁹⁸ *Ivi*, p. 176: «Sed huius generis mala pene innumerabilia ex veteri & nostrorum temporum historia, in medium afferre, nullius prope negotii fuerit».

ter-*historiae*. «As pertains to the terror-inducing examples of the poets and of certain historians», Dudith remarked, «it shall be sufficient to reply, albeit briefly and simply: poets, and also those historians, wrote about the prodigies of comets as they frequently did about many other things; they wrote those things about comets which they entrusted to letters popularly, according to the opinion of the common and inexpert multitude, and not according to the truth or their own opinion».⁹⁹ He thus came close to recognising that the supposed portentousness of comets was a self-fulfilling prophecy, leading authors aware of the theory to generate records of the phenomena that connected them to events.

Of all the contributors, however, it was Grynäus who engaged with historical authority most directly, devoting a chapter of his *Commentarii duo* to «the significance of comets, from experience and from histories».¹⁰⁰ «Those who hold out to us the experience and history of many ages», he began, «wish to show that the appearance of comets is always said to have been followed by something and that it was disastrous; and they show that this was the case with the examples of many years».¹⁰¹ Grynäus was not swayed: those who had produced cometary *observationes* had only been concerned to take note of the deaths and calamities that followed their appearance, and had not taken care to gather accounts of the favourable events that attended comets and which, as natural phenomena, they ought to produce.¹⁰² But

if you should say that faith ought to be placed in the histories, I would willingly concede it. But not every observation of events should be called a history, however. For *historia* is a true narration of things done, and claiming nothing besides the order and course of events. But if, therefore, the histories teach that very many comets were followed by unfavourable events and disasters, they do not immediately prove that the preceding comets were causes or signs of such things. For this ought to be demonstrated from other principles, not only claimed by bare assertion.¹⁰³

⁹⁹ *Ivi*, p. 179: «quod ad poetarum terriculamenta, & quorundam exempla historicorum attinet, abunde satis fuerit, si breviter ac nube [sc. nude] respondeatur: Poetas, atque ipsos etiam historicos, ut multis aliis de rebus saepenumero, sic de Cometarum quoque prodigiis, ex vulgi atque imperitae multitudinis opinione, populariter, non ex veritate, aut animi sui sententia scripsisse ea, quae de Cometarum eventis literis mandarunt».

¹⁰⁰ SIMON GRYNÄUS, *Commentarii duo, de ignitis meteoris unus: alter de cometarum causis atque significationibus*, pp. 58-60, headed: «De significatione cometarum, ab experientia & Historiis. Cap. XIX». The work is part of the *De cometis dissertationes* (cit. note 73), but separately paginated.

¹⁰¹ *Ivi*, p. 58: «Experientiam qui nobis obiciunt & historiam multorum saeculorum, ostendere volunt, Cometarum apparitionem semper dici aliquid & calamitosi secutum fuisse: remque sic habere plurimum annorum exemplis probant».

¹⁰² *Ivi*, p. 59.

¹⁰³ *Ibid.*: «Quod si historiis fidem adhibendam dicas, concedam libens, sed non omnis tamen

As in the medicine of the empirics, he argued, so in the study of comets, proper *historiae* would result from a record of autopsies, things seen for oneself, which established undeniable regularities amongst singulars of a commensurate kind. That was what the rules of logic concerning inductive inference from examples required.¹⁰⁴ For Grynäus, therefore, the use of cometary *historiae* as evidence of comets' maleficient portentousness overstepped methodological bounds.

The objections of Erastus, Squarcialupi, Dudith and Grynäus to cometary prognostication, occasioned though they undoubtedly were by the comet of 1577, were not informed by the most recent developments in parallactic astronomy. Erastus claimed that mathematical demonstrations proved that comets existed far below the aether, and directed those who doubted him to Regiomontanus and Apian.¹⁰⁵ Squarcialupi, though he mentioned the *nova* of 1572, castigated equally those who considered it a comet and those who named it a star, and he offered no quantitative observations of the comet of his own.¹⁰⁶ Dudith wrote in general terms rather than with reference to the recent phenomenon; Grynäus reported his observations, but starting from the premise that comets were sublunary, made no attempt to calculate its parallax.¹⁰⁷ At least some subsequent readers of the *De cometis dissertationes*, however, were so informed: among them Tycho Brahe, who considered some of the tracts in *De mundi aethereis recentioribus phaenomenis*, but also the imperial physician Thaddaeus Hagecius (1525-1600), who discussed them in a letter to Dudith of 1581, published as the *Apodixis physica et mathematica de cometis*, which treated comets in general and the comet of 1580 especially.¹⁰⁸

eventuum observatio dicenda est historia. Historia enim est rei gestae vera narratio, praeterque rei gestae ordinem ac seriem nihil asserens. Quod si igitur Historiae docent, plerosque Cometis sequuta esse incommoda & calamitates, non statim probant, praecedentes Cometis, talium causas aut signa extitisse. Hoc ex aliis principiis demonstrare oportet, non nuda affirmatione tantum asserere».

¹⁰⁴ *Ivi*, pp. 59-60. On the reappearance of the Empiric vocabulary of *têrêsis* and *autopsia* in Renaissance medicine, which Grynäus uses in this passage, see POMATA, *Observation Rising: Birth of an Epistemic Genre, 1500-1650*, in LORRAINE DASTON – ELIZABETH LUNBECK (eds.), *Histories of Scientific Observation*, Chicago, University of Chicago Press, 2011, pp. 45-80, on 65-67. Significantly, in the light of Pomata's arguments, Grynäus's own «Observationes» of the comet of 1577 appear as an appendix to the *Commentarii duo*, on pp. 71-88.

¹⁰⁵ *De cometis dissertationes* (cit. note 73), p. 131. Thaddaeus Hagecius, in his *Apodixis physica et mathematica de cometis, tum in genere, tum in primis de eo, qui proxime elapso anno LXXX*, Görlitz, Ambrosius Fritsch, 1581, sig. B3v, criticised Erastus for misrepresenting Apian on this point.

¹⁰⁶ *De cometis dissertationes* (cit. note 73), pp. 68-69.

¹⁰⁷ GRYNÄUS, *Commentarii duo* (cit. note 100), pp. 71-88.

¹⁰⁸ TYCHO BRAHE, *Opera Omnia*, ed. by John Louis Emil Dreyer, 15 vols., Copenhagen, Nielsen & Lydiche, 1913-1929, IV, pp. 358-361; HAGECIUS, *Apodixis physica et mathematica* (cit. note 105), B3v.

Hagecius' little-known tract is interesting, both because of the light it sheds on Dudith's evolving opinion in response to parallaxic evidence, and for what it confirms about the extent of cometary divination's vulnerability to the demise of scholastic physical theory. It begins with a letter from Dudith to Hagecius, which confirms that the latter had informed the former about observational work on the comets of 1577 and 1580 demonstrating their supralunarity. Thus Dudith declared himself convinced, by Hagecius himself, and by Tycho Brahe and Paul Wittich, that the Aristotelian theory of comets was wrong – and, moreover, that this, alongside the work on the *nova* of Tycho, Cornelius Gemma, and Maestlin, called into question the whole of Aristotelian teaching concerning the eternal and incorruptible heavens.¹⁰⁹ But Dudith saw no reason to change his opinion about the treatment of comets as portents. If anything, as had been the case for Squarcialupi, a non-Aristotelian understanding of comets hardened his opposition to cometary divination: «if comets portend something, I contend that it is something entirely of a kind which is no less remote from our intelligence than comets are from our eyes».¹¹⁰

Hagecius declared himself «wonderfully diverted» by the *De cometis dissertationes*, and in particular praised the «literary and friendly duel» between Erastus and Squarcialupi, «one for Aristotle and the other against him, for the sake of the truth».¹¹¹ But the battle between them had not, he thought, been brought to a conclusion: whether a comet was a flame, a light or a quality, and whether all past comets (or only some) had been supralunar, were still to be determined.¹¹² Hagecius criticised, however, Squarcialupi's inference from his investigation into the nature of comets to his conclusion that they could not be any kind of sign.¹¹³ Indeed, Squarcialupi appeared to contradict himself when he argued that comets are «portents and miracles to the extent that their matter, place and the causes by which they are produced and shine are unknown»; this was a view that Hagecius could subscribe to.¹¹⁴ Ultimately, this left Hagecius close to Erastus's conclusion about comets' signifi-

¹⁰⁹ *Ivi*, sig. A2r-A2v.

¹¹⁰ *Ivi*, sig. A3v: «si prorsus portendunt aliquid cometæ, id totum quale sit, non minus ab intelligentia nostra, quam cometæ ipsos ab oculis, remotum esse contendo».

¹¹¹ *Ivi*, sig. Br: «tamen doctissimis illis disputationibus, pro veritate susceptis, mirifice sum oblectatus»; sig. Bv: «duo isti nostræ ætatis Philosophi excellentes, Erastus, inquam, & Marcellus, alter pro Aristotele, alter contra, literatum & amicum certamen, veritatis inquirendæ gratia, susceperunt».

¹¹² *Ivi*, sig. Bv.

¹¹³ *Ivi*, sig. B2v.

¹¹⁴ *Ibid.*: «portenta & miracula esse confitetur: quatenus eorum materia, locus & causæ a quibus fiunt, foveantur & fulgent, ignorantur».

cation, although not his Aristotelian account of their nature and their place in the universe. For Erastus, although he had claimed that comets could not be divine signs of particular events, did accept that they functioned as ‘general’ warnings «to mend our life, to resist sin, to turn to God with true penitence».¹¹⁵ Grynäus, too, considered it likely that comets could function as divine and universal signs, intended to teach humanity God’s will or to warn of punishments to come.¹¹⁶ For his part, Hagecius roundly criticised those who made specific predictions from cometary appearances, which he declared sinful and blasphemous.¹¹⁷ He also attacked those who had transformed the traditional ecclesiastical calendar, provided with the names of Christian saints and martyrs so that the people might be inspired by virtuous examples, into repositories of vane and impious prophecies, and sneered in particular at a German «Chalcas» who embellished his with characters of Hebrew, Greek, Syriac, Egyptian and Arabic and used them to predict great events and fatalities – a criticism levelled, if not at Paul Eber and his *Calendarium Historicum*, at one of his ilk.¹¹⁸

Hagecius did not, however, entirely reject astrological predictions, even particular ones, provided that they were understood to be the product not of «an exact science, but artful conjecture» and were «sober and modest» and not in conflict with the word of God.¹¹⁹ As comets were not, it now appeared, a burning of terrestrial exhalations in the atmosphere, Hagecius argued that they could not be natural signs of dryness and heat, or of their proximate consequences, winds and storms.¹²⁰ By its Saturnine appearance, however, the comet of 1580 appeared to warn «via a certain analogy» of disease, death, and the destruction of crops.¹²¹ And its path, when combined with that of the comet of 1577, formed a Burgundian cross, which might be taken as a presentiment.¹²² But as for «wars, changes, the destruction of kingdoms and empires, and similar calamities and confusions», Hagecius would say only that

¹¹⁵ *De cometis dissertationes* (cit. note 73), p. 19: «hoc solum ex Cometarum apparitione discimus, nos a Deo excitari & moneri, ut viram emendemus, peccatis resistamus, vera poenitentia ad Deum confugiamus».

¹¹⁶ GRYNÄUS, *Commentarii duo* (cit. note 100), p. 84.

¹¹⁷ HAGECIUS, *Apodixis physica et mathematica* (cit. note 105), sig. E2v-E3r.

¹¹⁸ *Ivi*, sig. E3r-E4r.

¹¹⁹ *Ivi*, sig. Fr: «non quidem exacta scientia, sed artificiosa coniectura [...] sobrias & modestas».

¹²⁰ *Ivi*, sig. Fv.

¹²¹ *Ibid.*: «ex quadam analogia».

¹²² *Ibid.*

since these are afflictions of God, with which God punishes us at will, I do not doubt that about these things we are warned by this comet as well, as if by a certain priest of God, and recalled to mend our life and ways. [...] But whether God will strike us with this or that affliction, or whether with that symbol of the cross a weightier cross has been imposed on our shoulders than up to now, or whether indeed that already imposed shall soon be lifted, and the finishing touch will soon be put on our disasters, there is no-one mortal who can certainly tell.¹²³

For Hagecius, as for Erastus and Grynäus, pious reflection led to an affirmation that comets were – or at least could be – divine signs, but not ones whose meanings could be determined with any certainty without revelation.

Increasingly, indeed, across northern and central Europe, witnesses to the phenomena of the 1570s and 80s were compelled to fall back on this or on a similar verdict: these novel lights in the sky were divinely created entities whose precise meaning could not be established by art or by reason. Scepticism about Ptolemaic and Arabic astrology led some, such as Erastus, to this conclusion. But uncertainty about the nature of the phenomena, and hence the abandonment of the scholastic explanation of comets' ability to function as signs of future events, encouraged others to accept it, including some Wittenberg-trained Philippists. Faced with the *nova* of 1572 and a sequence of apparently celestial comets, Lutheran scholars increasingly had recourse to the notion of special providence, the idea that these phenomena were divinely-ordained departures from the ordinary course of nature – though not, since they were part of the divine plan from the outset, miraculous interventions in the temporal world.¹²⁴ This favoured their continued interpretation as signs of God's power and calls to repent, while placing them beyond the reach of natural philosophical enquiry. Thus the pious readings and epistemological modesty of the early catalogue compilers – the claim that past comets could clearly be shown to betoken disasters but what *this* or *those* recent comets portended could not be clearly known in advance – propagated at the expense of particular astrological readings.

¹²³ *Ivi*, sig. Fv-F2r: «De bellis, mutationibus, & ruinis regnorum atque imperiorum, deque similibus calamitatibus, confusionibus [...] cum hae sint plagae Dei, quibus nos pro liberrima sua voluntate punit Deus: non dubitare me, de his nos per hunc quoque Cometam veluti per Dei quendam facialem commonefieri, & retrahi ad vitae morumque emendationem [...] Utrum autem hac an illa plaga percussurus sit nos Deus: aut num symbolo illo crucis graviorem crucem, quam hactenus, sit impositurus humeris nostris: an vero iam impositam propediem ablaturus, supremamque manum impositurus calamitatibus: nemo est mortalium, qui certo definire possit».

¹²⁴ METHUEN, «*This comet or new star: theology and the interpretation of the nova of 1572*», «*Perspectives on Science*», 5 (1997), pp. 499-515, and *Id.*, «*Special providence and sixteenth-century astronomical observation: Some preliminary reflections*», «*Early Science and Medicine*», 4 (1999), pp. 99-113.

The more astronomically-sophisticated cometary works of the period – such as the writings of Tycho Brahe and his correspondent Christoph Rothmann – need to be understood in this context. In his *Dialexis* on the comet of 1585, Rothmann resisted the pious interpretation of comets as divine creations whose nature was otherwise inaccessible to inquiry, but in rejecting the Aristotelian account of their nature as fiery exhalations in the atmosphere likewise rejected the view that they were indications of dryness and winds.¹²⁵ His alternative account of comets, that they were exhalations raised on high into the heavens, and condensed by God into a material body which caught the light of the Sun, did allow him to maintain that comets were created for mankind's benefit and were evidence of his wisdom and providence.¹²⁶ But he presented the inherited view, that comets were portents of «fearful evils, the death of kings and princes, the change of regimes and great disasters», only as a preface to his own interpretation, that comets function as a stimulus to astronomical inquiry.¹²⁷ It is noteworthy that these views about the physical nature and general significance of comets were contained in the three chapters of the *Dialexis* that Rothmann completed after the bulk of the treatise and that, as his extant correspondence attests, the particular significance of the 1585 comet was a matter he preferred to discuss with Landgrave Wilhelm IV, his patron, in person.¹²⁸ Rothmann evidently found it more difficult to navigate the natural philosophical and astrological thickets of contemporary cometology than to study the phenomena via parallaxic astronomy, and prognostication ultimately formed no part of his study.

Tycho's works suggest a gradually encroaching anxiety about the value of prognosticatory analysis. In his early account of the *nova* of 1572, the *De stella nova* (1573), and his German treatise on the comet of 1577, he offered an astrological interpretation of what each of these phenomena signified even as he showed that they defied Aristotelian cosmology.¹²⁹ In the latter case, he may well have drawn upon Mizauld's *Cometographia*, a text that he ac-

¹²⁵ CHRISTOPH ROTHMANN, *Dialexis cometae qui anno Christi MDLXXXV mensibus Octobri et Novembri apparuit*, as published in WILLEBRORD SNELL, *Descriptio cometae qui anno 1618 mense Novembri primi effulsit*, Leiden, Ex Officina Elzeviriana, 1619, pp. 124-125.

¹²⁶ *Ivi*, p. 134.

¹²⁷ *Ivi*, pp. 140-141.

¹²⁸ Rothmann to Landgrave Wilhelm IV, 11 October 1585, as transcribed in MIGUEL A. GRANADA, *Sfere solide e cielo fluido: momenti del dibattito cosmologico nella seconda metà del Cinquecento*, Milano, Guerini e Associati, 2002, pp. 205-206, on 206.

¹²⁹ BRAHE, *Opera Omnia* (cit. note 108), I, pp. 1-72, especially 30-34, and IV, pp. 381-396; JOHN ROBERT CHRISTIANSON, *Tycho Brahe's German Treatise on the Comet of 1577: A Study in Science and Politics*, «Isis», 70 (1979), pp. 110-140, especially 132-140.

quired in 1576.¹³⁰ He could perhaps have argued that a celestial rather than a meteorological origin rendered comets more suitable, not less, as a basis for prognostication, since instead of acting as intermediaries between celestial causes and terrestrial consequences they could be ascribed a causal power of their own. Instead, however, he denied knowledge of the matter of the heavens and the processes by which comets were generated, and called upon philosophers to cease contending «so uselessly about things they cannot resolve».¹³¹ They should «the more readily admit to a modest ignorance and say that comets are a special creation of God which come from unknown natural causes».¹³² Yet despite claiming not to know what comets were, Tycho prognosticated boldly: «the comet augurs an exceptionally great mortality among mankind (for it stood in the human constellation), the like of which has not occurred in many years».¹³³ *Historiae* provided him with the confidence to do so:

Comets, which have appeared at certain times since the earliest age, always have had something great to deliver to this lower world, as all histories concerning them do testify unmistakably and would be too long to recite here. Usually, however, experience has taught that they have aroused great dryness and heat in the air, mighty and destructive wind storms, also in certain places overwhelming water courses, and in other places terrible earthquakes, in addition to spoilage of grain and fruits of the earth, from which usually follows great scarcity, and among mankind, many fiery illnesses and pestilences and also poisonings of the air by which many people lose their lives quickly, and it also signifies great disunity among reigning potentates, from which follows violent warfare and bloodshed, at times also the demise of certain mighty chieftains and secular rulers.¹³⁴

In 1585 too, Tycho generated an astrological interpretation of the comet of that year, and published one under the name of his student Elias Olsen Morsing.¹³⁵ For Tycho therefore, at least until the mid-1580s, recourse to his-

¹³⁰ WILHELM NORLIND, *Tycho Brahe: En Levnadsteckning med nya Bidrag belysande hans Liv och Verk*, Lund, C.W.K. Gleerup, 1970, p. 353.

¹³¹ BRAHE, *Opera Omnia* (cit. note 108), IV, p. 383; translated in CHRISTIANSON, *Tycho Brahe's German Treatise* (cit. note 129), p. 133.

¹³² *Ibid.*

¹³³ *Ivi*, p. 138.

¹³⁴ *Ivi*, p. 137.

¹³⁵ BRAHE, *Opera Omnia* (cit. note 108), IV, pp. 399-414. See, in particular, p. 412: «Colligi enim potest ab omnibus historiis de Cometarum apparitione & effectu nobis quicquam certi indicantibus, multo graviore, evidentiore & diuturniore effectus fuisse Cometarum, qui rubicundo lumine incandescere videbantur, quam qui alibi & subpallidi conspecti sunt». On Morsing, see JOHN ROBERT CHRISTIANSON, *On Tycho's Island: Tycho Brahe and his Assistants, 1570-1601*, Cambridge, Cambridge University Press, 2000, pp. 323-325.

tory allowed Aristotelian meteorology and Ptolemaic-Arabic astrology to be teased apart, and the former understanding of comets rejected but the latter retained.

Further reflection, the reaction to the cometary prognostication published by Morsing, and perhaps his careful reading of the subsequent literature, including that of Erastus *et al.* and Hagecius, seem to have modified Tycho's stance, or at least eroded his confidence.¹³⁶ Thus in 1588 he promised to treat both the physical nature of comets, including the manner of their generation and their astrological significance, in the third volume of *De mundi aetherei recentioribus phaenomenis*, which would deal with the comets since 1577.¹³⁷ His deferral of the topic to a work he seems barely to have started, let alone completed, may have been strategic. It is noteworthy that, when he republished his analysis of the nova in the *Astronomiae instauratae progymnasmata* (1602), previously intended to be volume one of the series, he omitted the prognosticatory section.¹³⁸ And it is noticeable that, in his correspondence of the 1580s with Rothmann and others, he wrote little about either the material substance and generation of comets or their astrological significance.¹³⁹ This suggests rather that, although he recognised it was important to discuss and connect natural philosophical and astrological interpretations of comets, it was a topic about which he was increasingly having trouble finding something to say.¹⁴⁰

1577 AND ALL THAT: EARLY MODERN COMETS REVISITED

Study of the cometary catalogues of the sixteenth- and seventeenth-centuries, and of the long tradition of interpreting comets as signs and portents of

¹³⁶ As noted in *ivi*, p. 324, more than one correspondent suggested to Tycho that he was wise not have published such an astrological text under his own name.

¹³⁷ BRAHE, *Opera Omnia* (cit. note 108), IV, p. 377: «Quae vero Physicam & Astrologicam, de Generatione & Significatione talium peregrinorum Phaenomenon, dijudicationem proprie respiciunt, in Epilogo totius Operis, velut aliquoties promisimus (favente Numine) tractaturi».

¹³⁸ *Ivi*, III, pp. 97-107, especially 107: «Caetera quae Praedictionem Astrologicam continebant, volens relinquo».

¹³⁹ See MOSLEY, *Bearing the Heavens* (cit. n. 49), *passim*.

¹⁴⁰ On Tycho's shifting commitment to astrology, see also STEVEN VANDEN BROECKE, *The Limits of Influence: Pico, Louvain, and the Crisis of Renaissance Astrology*, Leiden, Brill, 2003, pp. 263-269. It should be noted, however, that what VANDEN BROECKE describes as the distinct discourses about comets developed by natural philosophers, churchmen, and mathematician-astrologers were much less distinct in the Philippist tradition, and that in that tradition the kind of 'pious but learned ignorance' about celestial apparitions which facilitated avoidance of specific predictions was quite common.

future events which they drew upon and represented, allows us to clear up some difficulties left by the mid-twentieth century view of the study of comets in the Renaissance. It offers a way to integrate the older accounts of historians such as C. Doris Hellman and Jane L. Jervis with the more recent ones by Sara Schechner Genuth and Tabitta van Nouhuys, which have recognised the significance of astrological enquiry in cometological work, and indeed to take account of the studies only now being undertaken into sixteenth-century writers on comets long neglected by historians.¹⁴¹ It no longer seems surprising that so many figures whom we associate with the science of the stars should have been concerned with comets *prior* to 1577, when their supralunarity was supposedly established. That comets were celestial phenomena was an ancient theory known in several variant forms to medieval and early modern scholars, and even if the meteorological interpretation of them was the orthodox one, this brought with it the notions that these meteors were generated by the action of the stars on terrestrial exhalations and were themselves astrologically significant. Both were good reasons to pay them close attention. Physicians had additional cause to be interested in these phenomena, since the events with which they were associated included plague and disease, and they were able to bring their expertise to bear on the theory of their significance, insofar as it invoked humoural medicine. Hippocrates and Galen and other medical authorities increasingly joined, therefore, the ranks of ancient authorities invoked in cometological texts. Learned princes also had good reason to commission analyses of comets – although some they received were no doubt unsolicited – since their persons and the security of their realms were held to be particularly at risk whenever they appeared. These views were not superstitions unsupported by evidence. On the contrary, they depended upon a causal understanding and upon past observations of comets and events that, during the sixteenth and seventeenth centuries, came to be presented and disseminated in increasingly comprehensive and systematic ways.

Both scholastic natural philosophy and judicial astrology came under attack during the period, and this, as well as the observation of the phenomena, encouraged the dissociation of scholastic and prognosticatory understandings of comets. Yet individuals were left with a variety of possible positions which

¹⁴¹ HELLMAN, *The Comet of 1577* (cit. note 34); JANE L. JERVIS, *Cometary Theory in Fifteenth-Century Europe*, Wrocław, Polish Academy of Sciences Press, 1985; SARA SCHECHNER GENUTH, *Comets, Popular Culture, and the Birth of Modern Cosmology*, Princeton, Princeton University Press, 1997; TABITTA VAN NOUHUYS, *The Age of Two-Faced Janus: The Comets of 1577 and 1618 and the Decline of the Aristotelian World View in the Netherlands*, Leiden, Brill, 1998.

they could choose to adopt. Some were most concerned to defend Aristotle's legacy against the encroaching astronomers who claimed supralunarity; we see them as overly tenacious adherents of a discredited theory, but they may well have perceived their opponents in similar terms, as holders of views that Aristotle himself had considered and rejected. Some individuals acknowledged that rejecting the scholastic view of the comets' physical nature also undercut explanations of their portentous significance, for good or for ill. Others, however, pointed to the amassed body of historical evidence as reason enough to retain a belief in their portentousness, even in the absence of a good causal account. This led to some opponents of astrology engaging with the very notion of history and historical inference, at least as it pertained to the interpretation of comets and associated events.

The Reformation played a part in the way that comets were interpreted, but scholars were not simply divided along confessional lines. Rather, a pious gloss placed on the interpretation of comets by Wittenberg scholars seems to have become a commonplace, perhaps because it was picked up and propagated by Antoine Mizauld, in his *Cometographia*, used by Catholics and Protestants alike. Possibly the emphasis on comets as signs of God's wrath and a call to repent had an earlier source, but it was not a prominent feature of the late medieval scholastic texts, so the understanding of comets seems to have become more 'superstitious' (in our sense of that term), not less, during the course of the sixteenth century. Indeed, the waning of the Aristotelian understanding of comets as terrestrial exhalations left their status as portents increasingly inexplicable in natural terms. That earlier histories of early modern comets failed to explore this relationship between the physical theory of comets and their interpretation as signs may be attributed partly to their authors' disdain for astrology, but partly to their adoption of Tycho's agenda in his published work on the comet of 1577, the *De mundi aetherei recentioribus phaenomenis* of 1588, which deferred consideration of such matters to a later volume – that never appeared – in favour of an exhaustive astronomical analysis. Putting more distance between ourselves and Tycho's strategically limited account of the comet of 1577, and the interpretation of it by his contemporaries, allows us greater insight into the issues that exercised the communities of natural philosophers, physicians, astrologers and mathematicians in this critical period.

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Comets, ‘new stars’ and other unexpected celestial phenomena up to Galileo’s telescopic discoveries have attracted the interest of historians of science, intellectual and cultural historians. These early modern ‘celestial novelties’ constitute the main subject of this volume, whose aim is to shed light on their reception and interpretation in science, natural philosophy, medicine, and their wider impact on European society.

Comete, ‘nuove stelle’ e altri fenomeni imprevedibili, incluse le scoperte telescopiche di Galilei, hanno attirato l’attenzione di storici della scienza, delle idee e della cultura. Le novità celesti della prima modernità costituiscono il tema principale di questo volume, che si propone di far luce sulla loro ricezione e interpretazione nella scienza, nella filosofia naturale, nella medicina, e sul forte impatto che ebbero sulla società europea.