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Published in:
Science in Contact at the Beginning of the Scientific Revolution

2004

[Link to publication](#)

Citation for published version (APA):
Håkansson, H. (2004). Tycho the Apocalyptic: History, Prophecy and the Meaning of Natural Phenomena. In J. Zamrzlová (Ed.), *Science in Contact at the Beginning of the Scientific Revolution* (pp. 211-236). National Technical Museum, Prag.

Total number of authors:
1

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TYCHO THE APOCALYPTIC: HISTORY, PROPHECY AND THE MEANING OF NATURAL PHENOMENA¹

Håkan Håkansson

To most of the people who witnessed the spectacle, it seemed as if the laws of creation had suddenly been put out of joint, as if the order of things had begun to crumble and the firmament was quaking and threatening to fall apart. An “unexplainable” and “divine wonder”, exclaimed the astounded Tycho Brahe, a “rarer and greater miracle than anything that has occurred since the creation of the world”². Indeed, had Plato, Aristotle or Ptolemy seen this mind-boggling marvel, wrote the Dutch scholar Cornelius Gemma, they would instantly have rejected everything they believed to know about the world. For in the face of this remarkable sight, man stood simply stripped and naked in ignorance, struck by the unfathomable omnipotence of the Highest.³

The appearance of a new star in November 1572, so bright that for some weeks it could be seen in broad daylight, sent a shock wave through Europe. While people were in dread and prophets spouted, a flood of leaflets, pamphlets and learned tracts flowed from the printing presses. According to Morten Pedersen, canon in Roskilde in Denmark, the miracle could only be compared to star of Bethlehem, inexplicably appearing before the birth of Christ. So what could this be but a harbinger of the Lord's Second Coming, a sign proclaiming that the End was at hand and that Christ, as prophesied in the Scriptures, was about to return as the absolute Judge of mankind?⁴ Others, like the German artist Georg Busch, interpreted the star as an unusually bright comet, though this did little to dampen its ominous character. The sinister phenomenon, claimed Busch, not only indicated that “the Omnipotent Divine Majesty is dreadfully angered by the great sins of the world”; the ‘comet’ was also the very birch used by our indignant Father to “awaken and soak our stony heart”. For decades, our “gross sins and vices” had risen towards the firmament as an “evil sinful smoke and fog”, until “God's wrath” had set them on

¹ I am indebted to Landskrona kulturförvaltning for giving me the opportunity to prepare this essay as part of the international project World View Network. I also wish to thank Martin Kjellgren, Department of History, Lund University, for his valuable comments on a draft of this paper.

² Brahe, *De nova et nullius aevi memoria prius visa stella, in Opera omnia*, ed. I. L. E. Dreyer (Copenhagen, 1913-1929), vol. I, pp. 19, 30. All translations are mine if not otherwise stated.

³ Gemma, *De naturae divines characterismis* (Antwerp, 1575), II, p. 111.

⁴ Martinus Petri, *Meditatio de face in Caelo visa, Anno 1572* (Ms., Lund University library), especially pp. 1-2, 14.

fire, giving rise to a poisonous smoke that would sweep over the earth and bring plagues and diseases, cause crops to wither, birds to fall dead to the ground, and bring death, war, famine and “all sorrows of the heart” over mankind.⁵

To most scholars, however, it was obvious that the star was something much more unusual than a comet. As the theologian David Chytraeus in Rostock noted, something similar had only occurred in the days of emperor Nero, when a star had suddenly appeared portending the coming fall of the Jewish people. Clearly, no one could doubt that the new star of 1572 was a “preacher of God”, foreboding “dreadful acts and terrible death”. For had not Christ Himself announced that the Last Days would be heralded by “fearful sights and great signs” in the heavens? What the world could expect was a grim period of war, famine, plagues and the “destruction of true faith”, until the “Son of man” would be seen “coming in the clouds with great power and glory” – Christ the Redeemer, the absolute Judge, who would sift the wheat from the chaff, the pious from the damned.⁶

In a similar vein Cornelius Gemma claimed that the star, like the miracle of Bethlehem, was a metaphysical creature, an angel, or possibly even God Himself cloaked in a mantle of light, announcing that “this darkest night shall be replaced by the daylight of happiness”. The star’s position in the heavens had in fact transformed the constellation Cassiopeia into a distinct cross, into an emblem of the crucified Saviour, gazing down on our miserable world which had now reached its rock-bottom of depravation and decay. In Gemma’s eyes, the star was nothing less than the biblical prophecies coming true – for in the Last of Days there “shall appear the sign of the Son of man in heaven: and then shall all the tribes of the earth mourn”.⁷ Some years later Gemma’s interpretation was repeated by the Swede Georgius Olai, who also made the phenomenon subject to an elementary astrological calculation. Since this prefiguration of Christ’s Second Coming had been visible for sixteen months until it finally faded away, it could be presumed that its astrological effects would culminate after a period of sixteen years – that is, in 1588, a year which according to a number of astrologers and biblical exegetes would turn out to be the most decisive in the history of Christianity.⁸

Though the year 1588 came and went with no more than the ordinary cataclysms,

⁵ Busch, *Om then nyia Stierno och Cometa, som syntes Anno Domini 1572 i Novembris månat* (Stockholm, 1573), sigs. A2^r, B2^r. Despite its apparently imaginative character, most of Busch’s theory was founded on commonly held notions. According to Aristotle, comets were a result of warm moisture, drawn up to the firmament by the influences of the heavenly bodies, where it was set on fire by the movements of the celestial orbs (Aristotle, *Meteorologica*, 1.4 [341b-342a]). Busch was probably also inspired by Paracelsus, who explained the plague as caused by man’s sins, rising like vapours towards the firmament, whereupon they rained down over the earth again. (Paracelsus, *Von der Pestilenz, in Sämtliche Werke*, ed. K. Sudhoff (München und Berlin, 1922-1933), vol. 8, especially pp. 380-381.)

⁶ Chytraeus, *Vom Newen Stern, welcher anno 1572 im November erschienen* (Rostock, 1577), especially sigs. A2^r-B1^r, C3^r-C4^r. St. Luke 21:11; St. Mark 13:26.

⁷ Gemma, *De naturae divines characterismis* (Antwerp, 1575), II, pp. 130-144; St. Matthew 24:30.

⁸ Olai, *Calendarium duplex, christianorum et iudaeorum, cum prognosticatio astrologico, på thet ottonde och thet nyonde åhrena öfver MDLXXX* (Stockholm, 1588), sigs. Bb1^r-Bb3^r.

the star's voice of doom was still reverberating with undiminished strength half a century later. In a sermon in Västerås cathedral, the Swedish bishop Johannes Rudbeckius emphasised the obvious parallels between the star of Bethlehem and the new star of 1572. Exactly when the End would come was impossible to ascertain, but the signs were unmistakable: the Last of Days were here and now.⁹

Until a few decades ago, the very foreignness of these notions confined them to the margins of historiography. Confronted with beliefs and conceptions so strange and otherworldly that they seem to beg questions about rationality and common sense, historians were both unable and unwilling to treat apocalyptic expectations as more than an historical curiosity. In his classic *The Pursuit of the Millennium* (1957) Norman Cohn gave a vivid account of the innumerable millenarian movements prevailing in medieval Europe: flagellants, Hussites, Taborites and Anabaptists, all of them enticed by the prophecies of a divinely instituted kingdom of happiness on earth – and few of them shunning from using violence to make it come true.¹⁰ But however overwhelming and well documented it was, Cohn's exposé did little to correct the notion that apocalyptic expectations constituted a marginal phenomenon in premodern culture. By its lop-sided focus on repressed and revolting groups – “disoriented peasants” and “fanatical anarchists” – the book paradoxically reinforced the impression that medieval apocalypticism was a manifestation of religious extremism, an intellectual aberration in blatant opposition to orthodox Christian ideas. Moreover, Cohn's attempt to correlate chiliastic movements with eruptions of social and political unrest tempted a number of scholars to interpret apocalyptic convictions as a kind of panic behaviour. The belief that the End was nigh, as well as the hope of an earthly paradise, was a result of plague, famine, economic collapse and social despair – an explanation that tended to reduce all forms of apocalyptic expectations to extreme phenomena.¹¹

In recent years, however, a much more complex picture has emerged. As a number of historians have shown – Robert Lerner, Robin Bruce Barnes, Marjorie Reeves, Bernard McGinn and a host of others – the conviction that the End is nigh has constituted a fundamental element in the Christian world view ever since it took shape during late antiquity. As early as in 601, Pope Gregory I noted that “the End of the present world is already near”, adding that “many unusual things will hap-

⁹ Rudbeckius, *Warningspredikan öfver thet Evangelium som plåghar förkunns på then andre söndagen i Adventet* (Västerås, 1637), sigs. D1^{r-v}.

¹⁰ Cohn, *The Pursuit of the Millennium: Revolutionary Millenarians and Mystical Anarchists in the Middle Ages*. (Oxford: Oxford University Press, 1957, revised edition 1970). Throughout this paper, I treat “millenarism” and “chiliasm” as synonymous concepts, both denoting the idea that the final End would be preceded by a divinely instituted millennium of peace and happiness on earth.

¹¹ Discussions of these shortcomings, which can only partially be attributed to Cohn himself, can be found in Robert E. Lerner, “The Black Death and Western European Eschatological Mentalities”, *American Historical Review* 86 (1981), pp. 533-552, and Robin Barnes, *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation* (Stanford: Stanford University Press, 1988), especially pp. 16-19.

pen” before the day of doom finally falls: famines, pestilences, earthquakes and terrible sights in heaven – “these signs of the End of the world are sent ahead so that we may have a concern for our souls”. Indeed, as a number of historians have emphasised, these notions only rarely served as a motivation for social protest and revolt. However spectacular and violent some of these movements may have been, apocalypticism primarily served as an orthodox and reinforcing element in premodern society, not as an instrument of rebellion.¹²

It was also an element that would gain an unequalled importance during the Lutheran Reformation. To Protestants in general, as to Luther himself, the Reformation was an event that could only be understood in the light of biblical prophecies describing the hardships of the Last Times. Exactly how these prophecies should be interpreted was certainly a matter of intense debate, but the main outlines were relatively clear: during the Last Days of history, when faith was weak and sin abundant, a chosen prophet would identify Antichrist – Satan’s earthly representative – whereupon the pious would be persecuted until the True Gospel prevailed and Christ returned as the absolute Judge of mankind. It was this conception of the last phase of human history that was to provide the foundation of Lutheran self-understanding. As Robin Barnes has underscored, “an apocalyptic view of the struggle between the Gospel and its enemies was basic to the original Protestant message”. In effect, the Reformation must itself be understood as an apocalyptic movement, founded on the belief that Luther’s identification of the Roman Church as Antichrist marked the beginning of the final battle between good and evil.¹³

In contemporary historiography, the realization that apocalyptic expectations were not an expression of religious extremism but a fairly normal way of making sense of present conditions has implied a shift in focus, from identifying the causes of these notions, to understanding their meaning and significance in early modern culture. Though the fear of an imminent End was undoubtedly fed by the profound social and religious upheavals of the sixteenth century, it has become clear that this fear was not a result of social change. Equally obvious is that many people viewed the social changes as a *confirmation* of an imminent End. To Luther, for example, the root of the German peasant revolt was unquestionable: “I suspect that the Devil feels the Last Day coming and therefore undertakes such an unheard-of-fact, as though saying to himself: ‘This is the Last, therefore it shall be the worst’, and he stirs up the dregs and knocks out the bottom of the world”.¹⁴ The very same message, claimed Luther, was announced by the plethora of “strange

¹² For a collection of apocalyptic texts from the period 400-1500, showing the continuity of these notions throughout the Middle Ages, see Bernard McGinn, *Visions of the End: Apocalyptic Traditions in the Middle Ages* (New York: Columbia University Press, 1979); Gregory I is quoted from p.

¹³ Barnes, *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation*, *passim*, the quoted passage can be found on p. 31.

¹⁴ Luther, *Wider die räuberischen und mörderischen Rotten der Bauern* (1525), in *D. Martin Luthers Werke: Kritische Gesamtausgabe* (Weimar, 1883-), vol. 18, p. 358.

portents and sights” that had been witnessed in recent years: tempests, diseases and incomprehensible visions in the sky, which could only mean that “the End of the world is close and that it will soon perish completely”. Like a man on his deathbed, “visibly turning pale and fading away, until he turns white, contorting his mouth and bulging his eyes”, nature itself was now at death’s door – “and it will crack and crumble until it falls apart and tumbles down”.¹⁵

Luther’s belief that the ongoing drama of the Apocalypse could be seen reflected in the spectacle of nature was neither uncommon nor an expression of religious rhetoric. The notion that nature constituted one of God’s ‘books’, in which the Word was revealed as plainly as in Scripture, had been commonplace since the early Middle Ages, and would remain so until the beginning of the eighteenth century. The importance of this conception can hardly be underestimated; in the early modern era it had an impact on the scientific world view as profound as its impact on theology. In the last decades, we have seen an entire generation of historians questioning and problematizing the traditional account of the so-called ‘Scientific Revolution’ of the sixteenth and seventeenth centuries, producing an overwhelming amount of research exposing the fundamental role of religion in early modern science. The myth that it was during these centuries that modern, secularised science was born has long since been refuted, and the earlier polarization between ‘moderns’ and ‘ancients’, between empirical and bookish scientists, is simply no longer credible. As a consequence, the number mysticism of Kepler, the light metaphysics of Galileo or the exegetical speculations of Newton no longer appear as inconsistent anomalies in a period when knowledge was supposedly liberated from religion and superstition. Instead, the religious dimension has emerged as an integral element of *all* natural science in the early modern era. Theology and science were not two irreconcilable ways of understanding the world, but different means to the same end – to discern the Creator behind the order of creation. Far from being in opposition to each other, natural science and theology were complementary: by confirming the omnipotence and wisdom of the Creator, science gained its *raison d’être*, and by verifying a religiously sanctioned world view it gained a meaning.¹⁶

This ongoing reappraisal of early modern science has not least affected the traditional picture of Tycho Brahe, in earlier historiography canonized as the father fig-

¹⁵ Luther, *Huspostilla* (Falun, 1848), pp. 7-8. For a fuller discussion of Luther’s apocalyptic notions, see Warren A. Quanbeck, “Luther and Apocalyptic”, in *Luther and Melancthon*, ed. Vilmos Vajta (Göttingen: Vandenhoeck & Ruprecht, 1961), pp. 119-128.

¹⁶ Recent research on the ‘Scientific Revolution’ is much too extensive to be listed here, but for some comprehensive discussions, see Andrew Cunningham’s articles on this theme: “Getting the game right: some plain words on the identity and invention of science”, *Studies in the History and Philosophy of Science* 19 (1988), pp. 365-389; “How the Principia got its name: or, taking natural philosophy seriously”, *History of Science* 29 (1991), pp. 377-392; as well as Cunningham and Perry Williams, “De-centring the ‘big picture’: *The Origins of Modern Science* and the modern origins of science”, *British Journal of the History of Science* 26 (1993), pp. 407-432.

ure of modern empiricism. Recently Jole Shackelford has pointed out that Brahe's conception of celestial causality was rooted in his ambition to reconcile theology with natural science within the framework of a Lutheran, Phillipist tradition.¹⁷ That Brahe's conception of science to a large extent was rooted in the tradition of Philip Melancthon implies that any attempt to describe Brahe as a 'modern' empiricist has to be termed an anachronism. For within this tradition, natural science – or properly speaking, natural philosophy – could only have one motive and one purpose: to serve as a complement to theology.¹⁸ Seen from this perspective it is far from surprising that Brahe could attribute biblical exegesis a fundamental role in his scientific programme. As Kenneth J. Howell has underscored, Brahe was indeed convinced that only empirical observations could produce exact knowledge. Simultaneously, however, he was aware of the fact that such knowledge was limited to mathematical predictions; it said nothing about the physical reality of things – which, on the other hand, he believed that Scripture did. Thus, a complete knowledge of the world could only be gained by reconciling empirical research with theological doctrines, a notion that had a much greater impact on Brahe's works than has previously been acknowledged.¹⁹

But the role of religion in early modern science was not limited to the use of biblical exegesis to lend credence to scientific conclusions. An aspect that has attracted less attention, but which draws a sharp line between modern and early modern science, is the religious significance that was attributed to natural phenomena in themselves. In virtually all natural sciences – in astronomy and medicine, as well as natural history – the category of 'meaning' was of vital importance to the early modern perception of physical reality. Heavenly phenomena, diseases, plants and animals were not merely phenomena to be explained and categorized, but signs to be interpreted and understood.²⁰ This is a dimension that emerges clearly in the works of Brahe. Throughout his career as an astronomer – from *De nova stella* of 1573 to the monumental *Astronomiae instauratae progymnasmata* completed

¹⁷ Jole Shackelford, "Providence, Power, and Cosmic Causality in Early Modern Astronomy: The Case of Tycho Brahe and Petrus Severinus", in *Tycho Brahe and Prague: Crossroads of European Science*, ed. John Robert Christiansson et al. (Frankfurt am Main: Verlag Harri Deutsch, 2002) pp. 46-69.

¹⁸ For an excellent discussion of Melancthon's conception of natural philosophy, see Sachiko Kusukawa, *The Transformation of Natural Philosophy: The Case of Philip Melancthon* (Cambridge: Cambridge University Press, 1995), especially pp. 124-173. As Kusukawa emphasizes, the Phillipist conception of natural philosophy must be kept apart from the modern concepts of 'science' and 'religion', since natural philosophy both reconciled and transgressed these later categories.

¹⁹ Kenneth J. Howell, "The Role of Biblical Interpretation in the Cosmology of Tycho Brahe", *Studies in the History and Philosophy of Science* 29 (1998), pp. 515-537. See also Ann Blair, "Tycho Brahe's Critique of Copernicus and the Copernican System", *Journal of the History of Ideas* 51 (1990), especially pp. 362-364.

²⁰ For a useful overview of the symbolic view of nature from antiquity to the early modern period, see Peter Harrison, *The Bible, Protestantism and the Rise of Natural Science* (Cambridge: Cambridge University Press, 1998), especially pp. 1-63. It should be noted, however, that Harrison's main thesis – that the most important factor making 'modern' science possible was Protestant literalism, effectively undermining the idea of nature as symbolic – is too simplistic.

in 1592²¹ – Brahe emphasized the nature of heavenly phenomena as signs and portents, as bearers of a meaning originating from the divine realm. Indeed, when publishing his first work on the new star of 1572, Brahe rejected any attempt to explain the phenomenon: “Let the theologians, who interpret the divine mysteries, remain silent; let the mathematicians, who describe the heavenly bodies, remain silent; and do not let them believe that they can say anything decisive about the appearance of this star and explain this great miracle”. The star was simply an “unexplainable” and “divine mystery”, he declared, a “Sign of God, predetermined by Him at the beginning of time and now finally exhibited to the world, which is hastening towards its evening” – “*Ostendum Dei ... nunc demum advesperascenti mundo exhibitum*”.²²

Despite his poetic formulation, however, Brahe emphasized the apocalyptic dimension of the star less than many of his contemporaries did. Later he rejected Gemma’s suggestion that it was God Himself who had appeared to man as a “superstitious”, “impious”, and even “blasphemous” idea.²³ Nor did he agree that the new star could be put on a par with the miracle of Bethlehem. The fact that the three Magi had been led to the Saviour’s crib, he noted, implied that the star of Bethlehem must have been a purely atmospheric phenomenon, whereas the new star of 1572 undoubtedly had its origin in the heavenly sphere.²⁴

Unsurprisingly, it is the latter conclusion that has attracted most attention in traditional historiography. Brahe’s proof that the star was a heavenly phenomenon, a conclusion in stark opposition to the Aristotelian commonplace notion of the heavenly realm as eternally constant and unchangeable, has frequently been hailed as a decisive step towards a ‘modern’ cosmology. Yet it is worth remembering that Brahe himself never regarded his results as incompatible with the authority of Aristotle, precisely because he viewed the star as a “sign of God”. In fact, when terming the phenomenon “unexplainable” Brahe meant exactly what he said: that the star had been created “outside the order of nature” – *praeter Naturae ordinis* – for God still had the power to break the ordinary laws of nature “and when He so wishes, He stops the rivers and makes the stars recede”.²⁵

²¹ The *Progymnasmata* was first published in 1602, but according to Kepler’s appendix the *Conclusio* was written in 1592; see Brahe, *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, p. 321.

²² Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 18-19.

²³ Brahe, *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, pp. 79-80.

²⁴ Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 18-19.

²⁵ Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 30, 19. The tendency of traditional historiography to describe Brahe’s discoveries as a break with the Aristotelian world view can only be termed an anachronism. Although his later studies of comets would convince him that the notion of solid crystal spheres was wrong, Brahe’s adherence to Aristotelian tenets remained to a large extent intact. Throughout his career he held on to the idea of a strict distinction between the sub- and supralunary realms, as well as to the Aristotelian notion of celestial causality. A break, in the proper sense of the word, with the Aristotelian world view did not take place until Galileo published his *Dialogue on two world systems* in 1632.

The cosmological and philosophical implications of Brahe's discovery, hailed by a posterity keen to make him emblematic of a 'scientific' approach to nature, were thus of minor importance to himself. Far from being an iconoclastic critique of Aristotle, *De nova stella* was a fairly conventional work, focusing on the significance and effects of the new star. Like many of his contemporaries, Brahe took his point of departure in the new star that had appeared in antiquity and gave a vivid account, based on biblical historiography, of the "remarkable changes" following in its wake: the sectarianism of the Jews, the hypocrisy of the Pharisees, as well as the "terrible ravages and baleful slaughters" that had devastated Judaea and the rest of the world. That similar "disastrous times" could be expected from the star of 1572, heralding "a new order" with regard to religion as well as politics, was simply "indisputable".²⁶

Brahe's use of biblical historiography to lend credence to his interpretation of the new star provides an illustrative example of how theology and natural philosophy interacted in early modern science. More important, however, is Brahe's discussion of the star's astrological effects, a subject to which he devoted more than half of *De nova stella*. When the star first appeared, it had a colour similar to the "benevolent Jupiter's light", so it seemed plausible that it foreshadowed a short period of happiness and prosperity. Some months later, however, it changed to a colour similar to Mars, seeming to indicate that this brief period of happiness would soon give way to great hardships: wars, revolts, the death of sovereigns, the fall of cities and empires, felonies, fires, murders, plundering, robberies, diseases, deaths and "all deplorable and horrible things".²⁷ Having come this far in his analysis, however, Brahe decided that he had said enough. Astrology was an unreliable art and for the time being he was reluctant to say anything about the conclusions that could be drawn from "another astrology" – a "truer and more secret" astrology, of a kind that "it would be unjust to reveal its mysteries". For all his reticence, however, he still painted a scenario of almost apocalyptic proportions, an impression reinforced by the concluding poem written by Anders Sørensen Vedel. Heedless of Brahe's reservations, Vedel explicitly likened the new star to the miracle of Bethlehem: our sinful and wretched world had now reached its final End, and after a period of gruesome event we would once again tread on paradisiacal ground – "step out, step out, of Egypt, Babylon and Sodom", Vedel urged, "for this new star promises a new land of Canaan".²⁸

The prominent position of astrology in *De nova stella* is far from surprising. The idea that heavenly bodies exerted influence on the terrestrial world was an integral part of the sixteenth-century world view, firmly rooted in Aristotelian philosophy and backed by centuries of scholastic authority. And yet, even though its basic

²⁶ Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 31-32.

²⁷ Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 32-33.

²⁸ Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 34, 71.

principles were commonly accepted, few disciplines were as debated and criticized as astrology. As early as in the fifth century, Augustine had forcefully condemned the astrological arts as a remnant of pagan idolatry, completely incompatible with Christian tenets. By claiming that the stars had power over man, he argued, the astrologers questioned both our own and God's free will, thereby rendering the Christian conception of the individual's salvation impossible. Augustine's conclusion was that celestial bodies could have a certain influence upon man's physical body, but never upon his soul and will – and hence they could not influence our actions. God, however, could certainly use celestial bodies as signs for proclaiming His will to man: in effect, heavenly phenomena could be portents of – but never causes of – future events. That the astrologers' predictions sometimes turned out "surprisingly true", Augustine remarked, was simply due to the fact that the astrologers had been "inspired in some mysterious way by spirits, but evil spirits, whose concern is to instil and confirm in men's minds those false and baneful notions about astral destiny".²⁹

But despite Augustine's denunciation, astrology kept on flourishing in clerical as well as popular circles during the following centuries, until it gained new support from the Aristotelian texts reaching Christianity in the twelfth century. In the Arabian world, Muslim scholars had recast Aristotle's notion that all natural processes were dependent on celestial influences into a kind of 'astrologized Aristotelianism', which was to have an enormous impact on medieval natural philosophy.³⁰ As a consequence, Christian scholastics had to engage in a difficult balancing act, simultaneously taking Augustine's theological critique of astrology and Aristotle's philosophical support of it into account. The result was often a compromise, summarized in the maxim *astra inclinant, sed non necessitant* – 'the stars affect, but do not force'. On the face of it, it was a compromise that conveniently reconciled theology with natural philosophy; and in practice Augustine's and Aristotle's views were often treated as interchangeable. A heavenly phenomenon could in one breath be described as a divine portent of future events, in the next as their direct cause. But it was also a compromise that allowed free scope for individual interpretation, and throughout the Middle Ages scholars engaged in animated debates, trying to de-

²⁹ Augustine, *Concerning the City of God against the Pagans* (London: Penguin Books, 1984), V.1-7, pp. 179-188, the quoted passage can be found on p. 188. The literature on medieval and early modern astrology is vast, but for some useful overviews, see John D. North, "Astrology and the Fortunes of the Church", *Centaurus* 24 (1980), pp. 181-211; Laura Ackerman Smoller, *History, Prophecy, and the Stars: The Christian Astrology of Pierre d'Ailly, 1350-1420* (Princeton, New Jersey: Princeton University Press, 1994); Eugenio Garin, *Astrology in the Renaissance: The Zodiac of Life* (London: Routledge & Kegan Paul, 1983), as well as the contributions in *'Astrologi Hallucinati': Stars and the End of the World in Luther's Time*, ed. Paola Zambelli (Berlin and New York: Walter de Gruyter, 1986).

³⁰ In practice, the natural philosophical underpinning of astrology was an extremely complex affair, and there was certainly no unison among scholars concerning the details. For a useful overview, see North, "Celestial influence – the major premiss of astrology", in *'Astrologi Hallucinati': Stars and the End of the World in Luther's Time*, ed. Paola Zambelli, pp. 45-100.

cide which part of the equation had precedence – the power of the stars or man's ability to conquer them. As a result, many scholars came to swing between utter distrust and fervent enthusiasm, unable to take their stand in a debate in which every argument could be used as a counter-argument. So, for instance, the French cardinal Pierre d'Ailly furiously attacked astrology during the 1380s, only to turn into one its most ardent supporters thirty years later. In both roles he based his opinion on the very same text by Thomas Aquinas, and in both roles he appeared a fairly typical representative of the Church.³¹

The issue turned no less problematic in the Lutheran world. Luther's Augustinian scepticism towards astrology was fairly well outbalanced by Philip Melancthon's more benevolent attitude – "I believe that Philip engages himself in astrology just as I take a liberal swig at the beer when having gloomy thoughts", as Luther sourly noted. Thus, in the decades following Luther's call for reform, the debate proceeded in the same old rut as it had for centuries.³² That Brahe was painfully aware of this debate is obvious from the lectures he gave on the "mathematical sciences" at Copenhagen university in the fall of 1574.³³ Time and again he emphasized the principal lack of reliability of astrology and how cautious one must be when considering its predictions. Yet, the fact that astrology was not an exact science did not preempt it of value: the heavenly bodies were not merely signs of future events, but also the cause of everything taking place in the world. "Our lower world is ruled and governed by the higher", and to deny the influence of the stars was tantamount to "disdaining divine wisdom" as well as "contradicting obvious experiences".³⁴ In fact, Brahe's introductory lecture was a grand defence of astrology, point by point refuting the objections of the critics and arguing for the discipline's conformity to Christian tenets. "The astrologers do not make man's will subordinate to the stars", he claimed, but do all agree that man by means of his reason can raise himself above the destiny of the stars. Those who wished could "conquer all malevolent inclinations they have received from the stars" whereas others chose "to live a brutish life, to be swept along by blind emotion and fornicate with beasts".³⁵

Nonetheless, Brahe's view of astrology included an element of determinism that must have been obvious to his audience. As he pointed out, the influences of the

³¹ Smoller, *History, Prophecy, and the Stars*, p. 32.

³² *D. Martin Luthers Werke: Tischreden*, vol. 1, no. 17, p. 7. For Luther's and Melancthon's different opinions on astrology, see Ingetraut Ludolph, "Luther und die Astrologie", and Stefano Carotti, "Melancthon's Astrology", both in *'Astrologi Hallucinati': Stars and the End of the World in Luther's Time*, ed. Paola Zambelli, pp. 101-107 and pp. 109-121 respectively. The central role of astrology in Melancthon's philosophy – and by extension in the Protestant university curriculum of the sixteenth century – is also treated in Kusukawa, *The Transformation of Natural Philosophy: The Case of Philip Melancthon*, pp. 124-173.

³³ The introductory speech, entitled *De disciplinis mathematicis oratio* and primarily constituting a defence of astrology, is printed in Brahe, *Opera omnia*, vol. I, pp. 145-170.

³⁴ Brahe, *De disciplinis mathematicis oratio*, in *Opera omnia*, vol. I, pp. 152-154.

³⁵ Brahe, *De disciplinis mathematicis oratio*, in *Opera omnia*, vol. I, pp. 163, 161.

stars varied from individual to individual: some are “affected more, some less, depending on their aptitude for receiving them or their immunity to them” – a conclusion implying that man’s will to some extent must be dependent on the stars. Indeed, he succeeded in turning Augustine’s classic argument against astrology – that twins born under the same constellation develop different personalities and live different lives – into an argument *for* astrology. Since the influences of the stars were constantly changing depending on “upbringing, education, conversation and similar changing circumstances”, the different fates and temperaments of twins could as easily be explained as a result of celestial influences, as an argument against them.³⁶ And as if this was not controversial enough he also dismissed the most famous and comprehensive critique of astrology in the Renaissance, Pico della Mirandola’s *Disputationes adversus astrologiam divinatricem* (1494), with the argument that Pico had died at the age of 32 – precisely as predicted by three different astrologers.³⁷

Consequently, Brahe’s defence of astrology was not uncontroversial, though he succeeded in giving an account balanced enough to mitigate the traditional objections. Even the orthodox Niels Hemmingsen, who had condemned astrology a few years earlier and who returned the anxious glances from Brahe’s audience by ironically lifting his academic biretta, seems to have accepted Brahe’s opinions as conformable to Christian faith.³⁸ But Brahe’s ability to argue for the legitimacy of astrology was not only to exempt him from theological critique; to a large extent it was also his engagement in astrology that brought him the royal support rendering his later work on Hven possible. That Brahe was granted the fief of Hven, as well as generous amounts of money from the royal treasury, was primarily a consequence of King Fredrik II’s need for a court astrologer. As Fredrik noted shortly before his death, Brahe had been “a faithful servant and friend [who] executed conscientiously that for which he had originally been employed” – “He cast dependable horoscopes for all my sons and gave me notice throughout my life as to all heavenly portents sent by God Almighty to warn me and my kingdoms”.³⁹ Clearly, it was a task that Brahe was more than willing to perform, although his reminders

³⁶ Brahe, *De disciplinis mathematicis oratio*, in *Opera omnia*, vol. I, pp. 161, 158-159.

³⁷ Brahe, *De disciplinis mathematicis oratio*, in *Opera omnia*, vol. I, p. 168. For a discussion of Pico’s critique, see Wayne Schumaker, *The Occult Sciences in the Renaissance: A Study in Intellectual Patterns* (Berkeley: University of California Press, 1972), pp. 16-27. A similar dismissal, though not as facile as Brahe’s, can be found in Melanchton’s preface to Sacrobosco’s *De sphaera*, which was a standard work at Protestant universities; see *Corpus reformatorum Philippi Melanctonis opera quae supersunt omnia*, ed. C. B. Bretschneider, vol. II, col. 533.

³⁸ Brahe’s notes describing the reception of the speech and the following discussion are printed in *Opera omnia*, vol. I, pp. 170-173. For Hemmingsen’s critique of astrology, see his *Assertationes de utilibus et perniciosis praedictionibus futurorum eventum* (Copenhagen, 1569).

³⁹ Quoted from Victor E. Thoren, *The Lord of Uraniborg: A Biography of Tycho Brahe* (Cambridge: Cambridge University Press, 1990), p. 339. Brahe’s horoscopes for the sons of Fredrik are printed in *Opera omnia*, vol. I, pp. 183-280.

of the unreliability of astrology often went unheard. To his friends he complained that the annual reports to the court often included “dubious predictions”, which like a boot could be made to fit “any leg, big or small, just as one pleases”.⁴⁰

In traditional historiography, these remarks have often been taken as proofs of a growing scepticism towards astrology, an interpretation that reflects a wish to make Brahe emblematic of ‘modern’ science to a far greater extent than the historical sources permit.⁴¹ However despite Brahe’s repeated remarks about the practical shortcomings of astrology, there is nothing that suggests that he ever doubted its theoretical principles and possibilities. A few mere years before his death he called attention to astrology as one of the fields to which he had made significant contributions. Though he for some time had doubted its practical value due to our insufficient knowledge of the motion of heavenly bodies, he had also tried to correct this deficiency by making careful observations, thereby ridding astrology of “mistakes and superstition”. Indeed, he claimed to have developed a new astrological method, “based on experience”, arriving at the conclusion that astrology “is really more reliable than one might believe”.⁴²

Whether one takes the claim of a new astrological method seriously or not – as always when discussing the occult arts he refused to reveal any details for fear of their abuse by ignorant and unworthy persons – it is obvious that his commitment to astrology was one of the factors motivating his astronomical works throughout his career. In fact, Brahe can be termed a “Lutheran astrologer” in exactly the same sense as Johannes Kepler. When defending his reform of astrology with the words “I am a Lutheran astrologer, throwing away the nonsense and keeping the kernel”, Kepler took his stand on a Philippist view of astrology and astronomy as two complementary and mutually dependent disciplines. Only conjointly could these

⁴⁰ Letter to Henrik Below, 7 december 1587, in *Opera omnia*, vol. VII, pp. 116–119, especially p. 117. A similar letter to an unknown addressee is printed in vol. VIII, pp. 240–241. The expression used by Brahe is *cothurnus*, a kind of high boot used in Greek dramas to make the actor appear taller.

⁴¹ This interpretation was established by J. L. E. Dreyer in his classic biography of 1890, *Tycho Brahe: A Picture of Scientific Life and Work in the Sixteenth Century*. Still in the 1970s, Wilhelm Norlind brushed aside astrology as “worthless” and “untypical” of Brahe, simultaneously emphasizing Brahe’s later rejection of this discipline; see Wilhelm Norlind, *Tycho Brahe: en levnadsteckning* (Lund: CWK Gleerup, 1970), pp. 46, 63–65, 129. In the modern standard biography, Victor E. Thoren gives a slightly more balanced view, but can hardly be said to do the subject justice. Of the 500 pages of this book, less than ten are devoted to Brahe’s astrology, reflecting an unwillingness to take Brahe’s claim that astrology was as important to his work as astronomy seriously. For Thoren’s discussion, see *The Lord of Uraniborg: A Biography of Tycho Brahe*, in particular pp. 216–219.

⁴² Brahe, *Astronomia instauratae mechanica*, in *Opera omnia*, vol. V, p. 117. See also his preface to Peder Jacobsen Flemløse, *En elementisch oc jordisk Astrologia* (Copenhagen, 1644; original edition 1591), sigs. A4^r–A8^r, in which he defends the principles of astrology. For some useful discussions of Brahe’s astrology, see Peter Zeeberg, *Tycho Brahes Urania Titani: et digt om Sophie Brahe* (Copenhagen: Museum Tusulanums Forlag, 1994), pp. 77–85; Günter Oestmann, “Tycho Brahe’s Attitude towards Astrology and his Relations to Heinrich Rantzau”, in *Tycho Brahe and Prague: Crossroads of European Science*, ed. John Robert Christianson et al., pp. 84–94; and John Robert Christianson, “Tycho Brahe’s Cosmology from the *Astrologia* of 1591”, *ISIS* 59 (1968), pp. 312–318.

disciplines give an adequate knowledge of God's work, and a reform of the one by necessity implied a reform of the other. *Rejecting* astrology, however, would be tantamount to "throwing out the baby with the bath water," as Kepler stated. To Kepler – as indeed to Brahe – the task of the astronomer was inseparable from that of the astrologer.⁴³

Brahe's seemingly contradictory attitude towards astrology was in fact rooted in a complex of problems that had haunted the discipline since its incorporation with Christian tenets. From the Middle Ages and onwards, scholars had often made a distinction between 'high' and 'low' astrology; between prophecies concerning world history in its entirety and predictions pertaining to individual persons. To many scholars, the fundamental dilemma of how to reconcile the idea of the individual's free will with the belief in the stars' influence appeared principally insoluble in 'lower' astrology; that is, the casting of horoscopes for individual persons. It was, however, a quandary that seemed less problematic when astrology was applied to the collective history of mankind, a fact rooted in the particular view of history prevailing in the Christian world. Following Augustine's *Civitas Dei*, Christian conceptions of history were characterized by a fundamental distinction between secular history and 'sacred' or universal history. Whereas secular history was based on the independent actions of free individuals, sacred history unfolded according to a divinely instituted scheme, a scheme encompassing humanity in its entirety and revealed in advance by the testimony of Scripture. To whatever extent individual events had to be understood as a result of independent choices, world history as a *collective* phenomenon was forever predestined, locked in God's unyielding Plan, stretching from the dawn of time to the fall of the apocalypse.

From a wider perspective, this awkward distinction was a natural consequence of the attempt to reconcile two logically incompatible elements: the belief that scriptural prophecies were true and the belief in man's free will. But by including an element of historical determinism this notion could also be used to legitimize an astrological theory of human history. In the ninth century, the Arabic astronomer Abu Ma'shar – in the Latin world known as Albumasar – had described history as structured according to the recurrent 'maximum' conjunctions between Saturn and Jupiter, occurring with an interval of 960 years. As the most powerful of all heavenly phenomena, these conjunctions constituted a kind of nodes in the flow of time; turning-points when entire empires and religions crumbled and when one era finally gave way to another. The impact of Arabic Aristotelianism on Christian thought inspired a number of European scholars to apply Abu Ma'shar's system

⁴³ For a discussion of Kepler's views of astrology, see J. V. Field, "A Lutheran Astrologer: Johannes Kepler", *Archive for the history of exact sciences* 31 (1984), s. 189-272; the quoted passages is to be found on pp. 219-220. Also see Kusakawa, *The Transformation of Natural Philosophy: The Case of Philip Melancthon*, pp. 124-173, 188.⁴⁴ For discussions of Abu Ma'shar's theory and how it was applied in the Christian world, see the secondary literature listed in note 27 above.

on biblical chronology, trying to correlate it with astrological theory.⁴⁴ In his magnificent *Opus majus*, the Franciscan Roger Bacon showed how every *coniunctio maxima* since the Creation had marked the beginning of a new world religion, from the birth of Judaism, via the fire cult of the Chaldeans, the sun worship of the Egyptians and the “pleasure-seeking and lecherous” idolatry of the Arabs, until Christianity finally triumphed – a position, however, it would only have until the very last conjunction called forth the lying sect of Antichrist from the dark.⁴⁵ Bacon’s simple scheme was eclipsed two centuries later, however, by the French cardinal Pierre d’Ailly’s grand attempt to range the events of world history according to the cyclic pattern of the heavens. Through a series of cumbersome calculations he succeeded in demonstrating how the recurring conjunctions had coincided with Cain’s slaying of Abel, the Flood, Moses and Christ, finally determining the arrival of Antichrist to the – not least from a French perspective – significant year of 1789.⁴⁶

In effect, the theory of the maximum conjunctions provided the basis for what Krzysztof Pomian has termed ‘chronosophy’: a conception of history in which the past, the present and the future were subsumed under one scheme, and in which the knowledge of the past implied an understanding of the future.⁴⁷ It is true that d’Ailly’s grandiose systematization never gained wider acceptance, but the notion that the conjunctions formed milestones in the flow of time soon turned into a commonplace. In 1564 the Bohemian astronomer Cyprianus Leowitz described how significant events of history corresponded to the regular pattern of conjunctions, giving an historical account which served as a corroborating background to his interpretation of the “sudden and violent changes” that were to coincide with the conjunction expected in 1583. Leowitz’s text stirred up a wave of apocalyptic expectations among European scholars and in the latter half of the sixteenth century a number of respectable authorities were to absorb themselves in ‘apocalyptic astrology’, a discipline in which biblical chronology and Christian eschatology, the historic and the prophetic, were fused under the encompassing framework of astrology.⁴⁸

⁴⁴ For discussions of Abu Ma’shar’s theory and how it was applied in the Christian world, see the secondary literature listed in note 27 above.

⁴⁵ Bacon, *Opus majus*, ed. John Henry Bridges (London, 1900), vol. I, pp. 255–262.

⁴⁶ The career and works of Pierre d’Ailly are masterfully treated in Smoller, *History, Prophecy, and the Stars: The Christian Astrology of Pierre d’Ailly, 1350–1420*; in this context see especially chapter 4, “Astrology and history”, pp. 61–84.

⁴⁷ Pomian, “Astrology as a Naturalistic Theology of History”, in *Astrologi Hallucinati: Stars and the End of the World in Luther’s Time*, ed. Paola Zambelli, pp. 29–43.

⁴⁸ Cyprianus Leowitz, *De coniunctionibus magnis insignioribus superiorum planetarum* (Lauringen, 1564), see especially sigs. M2^r, N2^r–N3^r for his discussion of the conjunction of 1583. Regarding apocalyptic astrology during this period, see Barnes, *Prophecy and Gnosis: Apocalypticism in the Wake of the Lutheran Reformation*, pp. 141–181, and C. Scott Dixon, “Popular Astrology and Lutheran Propaganda in Reformation Germany”, *History* 84 (1999), pp. 403–418.

Strangely enough, Brahe's commitment to 'higher', apocalyptic astrology has been almost completely ignored by historians, despite the fact that it was within this field he achieved his most far-reaching results as an astrologer. Whether Brahe adopted a more sceptical attitude towards 'lower' forms of astrology over the years will probably remain an open issue, but with regard to 'higher' astrology the extent of his belief turns more marked and more daring as his career as an observational astronomer progresses. 'High' astrology had certainly played a significant role even in his first work, *De nova stella*. Pointing out that the effects of the new star would coincide with the conjunction of 1583 he emphasized – as an echo of Leowitz, whom he had visited in Lauingen a few years earlier – the great turmoil that would follow in its wake: how entire empires would fall and a “new order with regard to religion and laws” see the light of day.⁴⁹ On the whole, however, Brahe was reluctant to speculate explicitly regarding the future destiny of the world when writing *De nova stella* – a reluctance that seems to have abated considerably when a comet appeared in November 1577.

The appearance of the comet of 1577 instantly stirred up a new wave of fear and wonder over Europe. In a matter of weeks the Copenhagen professor of theology Jørgen Dybvad had rushed a tract into print, vividly describing the fateful significance of the phenomenon. The coming winter would turn harsher and colder than any living could remember, the summer dryer and hotter than ever experienced. The crops were to wither, terrible storms sweep over the country and war, pestilence, poverty and “dreadful discord in religious issues” wreak havoc in the Danish kingdom. The comet was nothing less than a sign of God, revealed “in these Last Days” to remind us that “the End of the world” was close at hand.⁵⁰

If the intention of the tract was to promote Dybvad's career it proved well calculated. In January 1578, a mere two months after the appearance of the comet, he was promoted to professor of mathematics and royal calendigraph, an office that in practice threatened Brahe's unofficial position as court astrologer.⁵¹ A few months later, however, Brahe presented his counter-move in the form of a report to the court, written in a rather cumbersome German – the only language the German-born queen Sophie spoke – and including a devastating critique of Dybvad's

⁴⁹ Brahe, *De nova stella*, in *Opera omnia*, vol. I, pp. 31-32. For his meeting with Leowitz, see *Opera omnia*, vol. III, pp. 221-222. In *De nova stella* as well as in later works Brahe specified the interval of the maximum conjunctions to 800 years, a figure that was commonly used in the Renaissance instead of Albusasar's original period of 960 years.

⁵⁰ Jørgen Dybvad, *En nyttige Undervisning, om den Comet, som dette Aar 1577 in Novembri, först sig haffver ladet see* (Copenhagen, 1577), sigs. A2^r, B1^r, E4^{r-v}.

⁵¹ On Dybvad's career, see *Dansk Biografisk Lexikon*, vol. IV, pp. 373-376. For a discussion of the political aspect of Dybvad's text and how it threatened Brahe's position, see 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, and Thoren, *The Lord of Uraniborg: A Biography of Tycho Brahe*, pp. 128-132.

conclusions.⁵² Like the new star four years earlier, Brahe argued, the comet was a phenomenon originating in the heavenly sphere beyond the moon. Consequently, Aristotle's opinion of comets was "entirely false", a formulation contrasting dramatically to his diplomatic tone in *De nova stella*. Yet Brahe's primary motive was clearly not to attack the Aristotelian world view, but to overthrow Dybvad's analysis of the astrological effects of the comet. According to common practice, Dybvad had assumed that the effects of a comet could be calculated from its relative position to the known heavenly bodies, a method implying that comets could be treated as analogous to regular and predictable phenomena. Emphasizing that comets constituted heavenly phenomena, Brahe by contrast maintained that they must possess far greater powers than traditional philosophy acknowledged. Every comet constituted "a new and supernatural creation by God Almighty", the effects of which "have nothing in common with the influences of the planets, but actually works against them and violently upsets their normal workings, for they [i.e. the comets] overwhelm the natural signs of the stars with much greater powers and bring about their own effects instead".⁵³

Thus Brahe's empirical proof that comets originated in the heavens and not in the terrestrial atmosphere served to refute Dybvad's astrological conclusions, conclusions which – superficially at least – were strikingly similar to Brahe's own. As Brahe noted in his report, even "the ancients" had through "experience" discovered that comets often brought draughts, violent storms, floods, earthquakes, diseases and plagues that poisoned the air, as well as discord among potentates, with war and bloodshed in its wake. That this comet, brighter than any seen in the memory of man and with an "evil, saturnine appearance", was to strike with full force against the world was indubitable. "Great alterations and confusion in religious and spiritual issues" could be expected, as well as "new sects and the alteration of customs with great evil". The Jews would "suffer great persecutions", as would the "pseudo prophets... monks, priests, and everything that goes with the Popish religion". Indeed, the comet seemed particularly ominous of the Catholics – "undoubtedly they might expect to be repaid in good measure during these coming years for the ruthlessness, murder and pain which they have inflicted upon so many pious folk".⁵⁴

⁵² Brahe, *De cometa anni 1577*, in *Opera omnia*, vol. IV, pp. 381-396. An English translation of the text is included in Christianson, "Tycho Brahe's German treatise on the comet of 1577: a study in science and politics", pp. 132-140. In the following I have made some minor modifications of Christianson's translation.

⁵³ Brahe, *De cometa anni 1577*, in *Opera omnia*, vol. IV, pp. 383, 390. As early as in *De nova stella* Brahe acknowledged the possibility that comets could constitute heavenly phenomena, referring to the Arabic astronomer Albatagnius, but due to the lack of empirical data he conceded to leave the issue open; see *De nova stella*, in *Opera omnia*, vol. I, pp. 27-28.

⁵⁴ Brahe, *De cometa anni 1577*, in *Opera omnia*, vol. IV, pp. 391-394.

Given its explicit religious references, Brahe's report could easily be taken as a piece of Lutheran propaganda intended to strengthen his position at the Danish court. Yet the fact that Brahe, as we are about to see, repeated and developed these notions in works intended for publication implies that the allusions to the strife of the Reformation cannot be reduced to a tactical, career promoting move. On the contrary, the religious dimension of Brahe's report constituted the core of a prophetic belief that was to grow stronger and stronger with the years. In the very last section of his text he emphasized that the effects of the comet coincided with those of the new star of 1572, as well as those of the conjunction expected in 1583. Clearly, the appearance of the comet should not be seen as a singular event, but as part of a much grander pattern unfolding in the heavens – a pattern that would bring “great change and reformation” within spiritual as well as secular domains, more revolutionary “than anything that has hitherto occurred”. But however frightful this escalating pattern might appear, concluded Brahe, it “may even bode more for the better of Christendom than for the worse”. For “inasmuch as this greatest conjunction is the seventh since the beginning of the world” – a number which according to the “Hebrew kabbalists” signified the Sabbath – it “might be presumed that the eternal Sabbath of all Creation is at hand” – “*der ewige Sabat aller Creaturen*”.⁵⁵

That Brahe used an expression like “the eternal Sabbath of all Creation” in this context suggests that he attached a virtually boundless significance to these heavenly phenomena. In Christian exegetical tradition the expression referred to the “sabbatical rest” that Christ had promised the people of God in the Last Days of the world. According to a number of Church Fathers, history could be divided into seven separate ages, analogous to the seven days it took God to create the world, the last of which constituted the true consummation and “Sabbath” of history – “and on the seventh day God ended his work which he had made; and he rested on the seventh day from all his work which he had made”. This last Sabbath Age could, in turn, be identified with the age when Satan according to the Apocalypse of John would be bound in the bottomless pit, an age of peace and happiness when the Christian martyrs had been raised from the dead to “live and reign with Christ a thousand years”. Following this millennial kingdom of happiness, Satan would once again be loosed out of his prison to gather his forces – the people of Gog and Magog – whereupon the End was finally coming.⁵⁶

A controversial issue, however, was whether this millennial kingdom should be interpreted as a terrestrial paradise or as a purely spiritual state. As early as in the

⁵⁵ Brahe, *De cometa anni 1577*, in *Opera omnia*, vol. IV, p. 395. Brahe's reference to Jewish kabbalah in this context is misleading. The notion of the eternal Sabbath of all Creation was part of orthodox Christian tradition and in any case Brahe's knowledge of Hebrew Kabbalah seems to have been limited.

⁵⁶ Hebrews 4:4-9; Genesis 2:2; Revelation 20:3-10.

third century, Augustine had forcefully attacked those 'chiliasts' and 'millenarians' – from the Greek *chiloi* and Latin *millennium*, meaning a period of a thousand years – who imagined this Sabbath as an age when man would “rest in the most unrestrained material feasts”, a kind of divinely instituted scholarland in which Christian ethics had been supplanted by sundry orgiastic excesses. To Augustine, such an idea seemed so unlikely that Scripture's reference to a millennial kingdom had to be interpreted as a mere symbol of the Church's perfection in the last age – an age that had begun with the birth of Christ and was already approaching its end.⁵⁷

The condemnation of chiliastic notions by the early Fathers made the dream of an earthly paradise virtually non-existent for the following six centuries. In the eleventh century, however, the idea gained new force, encouraged by some incautious remarks which Bede Venerabilis had made when describing the breaking of the seventh seal as the beginning of a short sabbatical rest on earth. That Bede himself had been explicitly hostile to chiliastic ideas did little to cool the enthusiasm of his followers. In the centuries to come a number of scholars gave free vent to the dream of a future kingdom of happiness on earth, a dream that captivated even the most orthodox of Christian orders, the Dominicans. But the true breakthrough for chiliastic ideas came with the Cistercian Joachim of Fiore, who at the turn of the century 1200 wrote a number of texts in which God's Plan was elucidated by a cumbersome study of biblical chronology. Sophisticated verging on the incomprehensible, Joachim's chronological analyses were to inspire generations of scholars, not least since he interpreted the Old Testament prophecies about a Golden Age – an age when the swords shall be beaten into plowshares and the wolves shall dwell with the lambs – as referring to a future, earthly reality. Following Satan's capture, the breaking of the seventh seal would mark the beginning of the Sabbath of the entire Creation, an age of peace and happiness lasting until Christ returned as the invincible Judge of mankind.⁵⁸

Joachim's influence on medieval views of history can hardly be underestimated. Although the Church officially assumed an unsympathetic attitude towards chiliastic notions, a considerable number of scholars found the dream of a terrestrial paradise too tempting to resist. To many of these scholars, this dream also provided a means to resolve the tension inherent in the biblical account of the Last

⁵⁷ Augustine, *Concerning the City of God against the Pagans*, XX.7, 9, pp. 906-910, 914-918.

⁵⁸ For some useful overviews, see Robert E. Lerner's "The Medieval Return to the Thousand-Year Sabbath", in *The Apocalypse in the Middle Ages*, ed. Richard K. Emmerson and Bernard McGinn (Ithaca: Cornell University Press, 1992), pp. 51-71, as well as his essay "Millennialism", in *The Encyclopedia of Apocalypticism*, vol. II, ed. Bernard McGinn (New York: Continuum, 1998), pp. 326-360. The influence of Joachim of Fiore has been treated thoroughly by Marjorie Reeves, especially in her classic *The Influence of Prophecy in the Later Middle Ages: A Study in Joachimism* (revised edition London: University of Notre Dame Press, 1993). For the Old Testament prophecies about a Golden Age, see in particular Micah 4:3-4 and Isaiah 11:6-9.

Days. In the New Testament these days are described as a mounting crescendo of unbearable terrors, whereas the Old Testament portrays them as a Golden Age of prosperity and peace – two contradictory accounts, which in chiliastic chronosophy often fused into one. Taking their cue from early Fathers like Lactantius, they described the last phase of history as a series of abominable hardships finally leading to a paradisiacal Sabbath on earth, an age when the stars will be brighter and the plants bear fruit in superabundance. Christian apocalyptic notion thus came to swing between terror and hope, between horror at the awaiting hardships and trust in the bliss they would ultimately lead to. In the following centuries, these ideas were modified and embellished ad infinitum. According to some interpreters, the hardships of the Last Days would terminate when a human, divinely instituted sovereign founded a millennial kingdom, an idea inspired by the prophecies of the “Tiburtine sibyl” translated from Greek in the eleventh century. Others claimed that this heroic ruler was God’s instrument to cleanse the world of sin, a kind of human avenger who would found his kingdom of happiness on the blood of the godless. Yet others were convinced that the world was so deeply immersed in wickedness that only a man of evil was capable of cleansing it, a minion of Satan who would wipe the slate clean by a veritable bloodbath, thereby laying the foundation for a paradisiacal Golden Age.⁵⁹

Accordingly, although the prelates of the Church officially remained unsympathetic to these visions – as would later the Protestant reformers – chiliastic expectations were by no means limited to groups of radical fanatics and social revolutionaries. The dream of a terrestrial paradise also inspired a number of orthodox scholars and at the dawn of the Renaissance similar ideas had turned virtually commonplace. So, for instance, was the famous enterprise of Christopher Columbus rooted in his conviction that the appearance of Antichrist and Judgment Day was drawing nigh. Inspired by the works of Pierre d’Ailly, Columbus viewed himself as God’s instrument, destined to fulfill the prophecies of the Holy Scripture. According to him, the discovery of the West Indies had been prophesied in the Apocalypse, in which it is stated that “a new heaven and a new earth” will replace the old one before history reached its consummation, and in his letters he called himself Christoferens, “the bearer of Christ”, who according to the prophecy of the apostle Paul brought true faith to the corners of the world before the End fell.⁶⁰

Brahe’s belief that the “eternal Sabbath of all Creation” was at hand was thus far

⁵⁹ Apart from the references listed in the previous note, see also McGinn, *Visions of the End: Apocalyptic Traditions in the Middle Ages*, pp. 23-24 concerning Lactantius, and pp. 43-50 concerning the prophecies of the Tiburtine sibyl.

⁶⁰ For a discussion of Columbus’ religious motives, see Pauline Moffit Watts, “Prophecy and Discovery: On the Spiritual Origins of Christopher Columbus’ Enterprise of the Indies”, *American Historical Review* 90 (1985), pp. 73-102. Cf. Romans 11:25-27; Revelation 21:1; 2 Esdras 6:42. That chiliastic notion cannot be termed heterodox in the proper sense of the word is discussed in Lerner, “The Black Death and Western European Eschatological Mentalities”.

from unique. The notion that the seventh conjunction marked the beginning of the last phase of human history had a number of predecessors among the apocalyptic astrologers working in Protestant Europe. It is true that Brahe firmly repudiated Dybvad's opinion that the comet of 1577 was a portent of an approaching Judgement Day: "This comet ... cannot signify the End", for "although the End of the world, according to the predictions of Christ and the prophets, cannot be too distant, yet the termination itself cannot reliably be foreseen".⁶¹ But far from being a repudiation of apocalyptic interpretations as such, Brahe's remark served as an argument for an alternative apocalyptic interpretation of the comet – a chiliastic interpretation.

The most exhaustive and flamboyant expression of Brahe's chiliasm can be found in one of his last works, the huge *Astronomiae instauratae progymnasmata* – "Introduction to a restored astronomy" – in which he devoted more than eight hundred pages to a detailed account of the new star of 1572. When he in 1592 completed the manuscript, it was by writing a prophetic testament, a vision of the coming future of Christendom, as magnificent as it was terrifying. As in his report on the comet, he portrayed the new star twenty years earlier as portending violent religious upheavals. At last the "pharisaic" and hypocritical fripperies of the Catholic Church, for centuries used to "bewitch ignorant and incautious people", would be swept away for good. Simultaneously, the star had presaged the new age beginning with the conjunction of 1583, an interpretation that Brahe supported by accounting for the almost inconceivable events that had coincided with previous conjunctions. The first had occurred in the days of Enoch, the man who had "walked with God" and had been taken to heaven without seeing death. The second had occurred in the days of Noah, when the whole world had been cleansed from sin by the Flood; the third when Moses had brought the faithful out of Egypt; the fourth when the kingdoms of Israel reached their height; the fifth when Jesus Christ, our Saviour, was born, and the sixth when the empire of Charlemagne was flourishing.⁶²

And now the seventh and last of the conjunctions had taken place, bringing grander and more extraordinary changes than ever witnessed. What could be expected, wrote Brahe, was a "sabbatical" era, a "Golden Age" of the kind envisioned by the biblical prophets Micah and Isaiah; an age when swords shall be beaten into plowshares, spears into pruninghooks, and peace reign over the entire world. An age when the wolves shall dwell with the lambs, the leopards lie down with the kids and the calves with the young lions, which shall only eat straw like the oxen. An

⁶¹ Brahe, *De cometa anni 1577*, in *Opera omnia*, vol. IV, p. 396. Cf. Matthew 24:36: "For of that day and hour knoweth no man, no, not the angels of heaven, but my Father only".

⁶² The prophecy is printed in Brahe, *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, pp. 309-319; in this context see especially pp. 310-312. Brahe kept reworking the manuscript of this work until his death, but the astrological *Conclusio* was written in 1592; see Kepler's note in Brahe, *Opera omnia*, vol. III, p. 321. Concerning Enoch, see Genesis 5:24 and Hebrews 11:5.

age when no evil exists, for “the earth shall be full with the knowledge of the Lord, as the waters cover the sea”. Passage upon passage Brahe cited the innumerable prophecies, transmitted “by God’s truthful spirit”, that had promised the pious such an era of “earthly happiness” before the Last Judgment was pronounced.⁶³

This coming paradise, however, was not without victims. It also seemed clear to Brahe that “a great cleansing and extermination of the impurities and confusion of the world” was needed before this age could begin. The earth had to undergo a baptism of fire, rinsing sinners as well as their sins from its surface – for had not Scripture prophesied that Gog and Magog were to ravage the world before the End? And in this context the recent heavenly phenomena suddenly gained an ominous significance in Brahe’s text. The star of 1572, the comet of 1577 and the conjunction of 1583 were not only harbingers of a millennial kingdom of happiness; they were also the instruments used by God to call forth the dark forces that would cleanse the world of sin. It was under their astrological influences that the biblical Gog, lord of Magog, was to be born and initiate his furious war expedition over the world. Since the new star had preceded the maximum conjunction with nine years, Brahe expected the warlord Gog to be born nine years after the conjunction – in 1592, the very year he wrote his remarkable prophecy. Moreover, according to Brahe’s calculations, the influences of the star primarily affected “Moscovia” or Russia, particularly the area bordering on Finland. Thus it was from this region that one could expect Gog to come with his army, devastating and laying waste everything in his way. Indeed, as Brahe emphasized, this conclusion had support in the Scriptures: relying on the standard techniques of bible exegesis, Brahe noted that the name Magog in Hebrew is written as *Mesech*, a word properly transliterated into Latin as *Mosoch*, which incontestably seemed to indicate the *Moschos* – the Russians.⁶⁴

And yet, however far-fetched and exorbitant Brahe’s prophetic vision may seem to a modern reader, it was far from original. The notion of an evil warlord cleansing the world of sin before the Sabbath Age could begin had been a commonplace element in many medieval chiliastic scenarios. The historic pattern created by the recurring conjunctions had been treated by innumerable scholars and Brahe’s chronology closely followed the one presented by the French mystic and kabbalist Guillaume Postel in a work on the new star of 1572, a work that Brahe in another context characterized as a hotchpotch of probabilities and sheer idiocies.⁶⁵ Brahe’s

⁶³ Brahe, *Opera omnia*, vol. III, pp. 312-314; Micah 4:3-4; Isaiah 11:6-9.

⁶⁴ Brahe, *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, pp. 311, 314-315. Concerning Gog and Magog, cf. Revelation 20:7-10 and Ezekiel 38-39.

⁶⁵ For Postel’s discussion of the chronology of conjunctions and how the seventh conjunction marked the beginning of the sabbatical rest, see his *De nova stella quae iam a XII die Novembris anni MDLXXII*, printed as an appendix to Cornelius Gemma, *De peregrina stella quae superiore anno primum apparere coepit* (n.p., 1573), especially sig. B2^r. For Brahe’s critique of Postel, see *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, pp. 229-233.

exercises in biblical exegesis to prove that Magog was identical to the Russians were taken from Sebastiano Castalione's annotated bible edition, but the interpretation was also lent support by Protestant authorities like Phillip Melancton and Caspar Peucer.⁶⁶ Indeed, the only original element in Brahe's analysis was his discovery that the new star as well as the comets were heavenly phenomena, a fact that enabled him to attribute far greater astrological effects to them than traditional philosophy granted.⁶⁷

Like most astrologers, Brahe based his prophetic interpretation on a wide range of sources, stemming from widely different intellectual contexts. Ostentatiously unconcerned about authenticity, he invoked the prophecies of the Babylonian oracles, describing how the war of Gog would be preceded by a shining star, within four years followed by a flaming comet, a prophecy which point by point seemed to have come true. Still more evidence could be found in the previously unknown text that had been found engraved on a stone table in Switzerland as late as 1520. According to the text, which Brahe scrupulously quoted in his work, it was a prophecy of the Tiburtine sibyl, claiming that a "star will rise in Europe over the Iberians, at the great house of the north." While the beams of the star enlightened the world, this "house" – presumably a princely house – would conquer Europe, whereupon flaming comets would appear in the heavens, the firmament shake, the planets leave their courses, the heavenly spheres jostle one another, the sea rise to the mountain tops and the earth be plunged into utter darkness. Certainly, noted Brahe, the prophecy could be interpreted in different ways. Since it explicitly referred to the "Iberians", the ancient people living in the Pyrenean peninsula, some had even suggested that it alluded to the Spanish royal house. Yet, to Brahe it seemed obvious that the text must refer to the "Iberians" living in the north and whom the new star was now beginning to affect with its terrible influences. The Russians.⁶⁸

Needless to say, Brahe's self-assumed role as an apocalyptic and chiliastic prophet glaringly contrasts with the traditional picture of him as a remarkably 'modern' and empirically oriented scientist. Any attempt to downplay the significance of his astrological and apocalyptic notions, however, would result in an anachronistic understanding of his works. Like all sixteenth century scientists, Brahe viewed empirical knowledge as reconcilable with theologically grounded conceptions.

⁶⁶ Brahe explicitly refers to Castalione's bible edition (Basel, 1551) in his text. For Melancton's and Peucer's similar interpretations, see their edition of Johann Carion's *Chronica*, one of the most widely read works during the Reformation: *Chronicon Carionis expositum et auctum multis et veteribus et recentibus historiis ... a Philippo Melanctone et Caspar Peucero* (Wittenberg, 1572), pp. 22, 488.

⁶⁷ Brahe, *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, pp. 310-311.

⁶⁸ Brahe, *Astronomiae instauratae progymnasmata*, in *Opera omnia*, vol. III, pp. 316-319. The "Tiburtine" prophecy invoked by Brahe did not belong to the Tiburtine texts known in the Middle Ages, but was first published in Cornelius Gemma's *De naturae divinae characterismis*, II, pp. 149-151, a work to which Brahe explicitly refers.

Far from being in opposition to each other, *liber naturae* and *liber Scripturae* were two complementary sources of knowledge, ultimately carrying the same message. Astrology clearly gained an increasingly important role in Brahe's works over the years, turning increasingly theological in character. Reflecting a general tendency in Protestant astrology in the latter half of the sixteenth century, there was an escalating propensity in Brahe's works for making astrology an instrument of apocalypticism.⁶⁹

Whether Brahe's chiliastic expectations in practice came to change over the years is a question of interpretation, however. The key elements that provided the basis of his interpretation in 1592 – the new star as a portent of the conjunction in 1583, ushering in a “new order with regard to religion and laws” – can all be found in *De nova stella* written twenty years earlier, although the hopes of a “a new land of Canaan” were explicitly expressed only in Vedel's concluding poem. Still, it is quite possible that Brahe harboured chiliastic expectations even at the beginning of his career, expectations that were to become increasingly pressing as his knowledge of different textual sources grew.

This conviction was fully conformable to the scepticism towards lower forms of astrology that Brahe – ostentatiously at least – demonstrates in his later letters and remarks. For while individual horoscopes always contained an element of uncertainty due to the free will of man, astrological prognostications concerning world history as a whole could be attributed deterministic consequences without violating Christian tenets. In his lectures at Copenhagen university, Brahe emphasized that God used the heavenly bodies as instruments for engineering His “secret Plan” (*arcanum consilium*), a Plan which “never permits anything new or diverges from its previously settled course”. Thus, the effects of the heavenly bodies had been predetermined since the beginning of time, a fact that was equally true of the “unnatural” phenomena appearing in recent years as of the regular and recurrent configurations of the planets. In *De nova stella* he defined the new star as a sign of God, “predetermined by Him in the dawn of times and now finally revealed to the world”. Similarly, the effects of comets were explicitly described as “predestined”.⁷⁰ Like the regular pattern of the recurrent conjunctions, these unpredictable phenomena were part of God's preordained Plan, a Plan that was inexorably carried out regardless of man's wishes and choices.

⁶⁹ On the theologizing tendency in late sixteenth century astrology, see for example Barnes, “Hope and Despair in Sixteenth-Century German Almanacs”, in *Die Reformation in Deutschland und Europa: Interpretationen und Debatten* (Heidelberg: Gütherloher Verlaghaus, 1993), pp. 440-461. Cf. how Victor E. Thoren in his standard biography bypasses the astrological discussion in *Progymnasmata* – the most comprehensive in Brahe's entire production – with the remark that not even in this late work he “could resist some astrological second-guessing”; Thoren, *The Lord of Uraniborg*, p. 218.

⁷⁰ Brahe, *De disciplinis mathematicis oratio*, in *Opera omnia*, vol. I, p. 154; *De nova stella*, in *Opera omnia*, vol. I, p. 19; and *De cometa anni 1577*, in *Opera omnia*, vol. IV, p. 390.

The deterministic character of Brahe's apocalyptic astrology is in itself worth emphasizing, for although it was fully consistent with Christian doctrine it contrasted sharply with the prevalent Lutheran view. In the Lutheran world, it was a widely held belief that the divine punishments brought about by the heavenly bodies could be fended off by praying and making penance. As Johan Warwick, court physician of king Fredrik II, wrote when the plague was ravaging Denmark in 1577: "since sin is the particular and common cause of all misery, wretchedness and tribulation, sickness and death, each and everyone should turn to God by making penance, relinquishing sin, and piously and with assiduous prayer surrendering to the protection of God Almighty".⁷¹

It was largely this belief in man's active, moral interplay with the divine realm that gave the idea of the astrological effects of the planets – God's instruments for punishing a sinful humanity – such an impact upon sixteenth-century Protestant culture. As Robert Scribner has emphasized, the classic view that Protestantism brought about a "secularization" or *entzauberung* of nature is fundamentally flawed. For although Protestant theology repudiated the Catholic view that nature could be the bearer of sacrality, the Reformation did not result in an estrangement of God from the material world. Rather, it transformed the relation between the divinity and physical reality, turning a "sacramental" view of nature into a "moralizing" conception of the universe.⁷² To sixteenth-century Protestant theologians, God was absolutely separate from physical reality, implying that nature could not have any form of implanted sacredness, nor could it impart God's grace upon man. It could, however, be regarded as God's instrument for reciprocating man's moral conduct, a conception that was central to the philosophy of, for instance, Phillip Melancthon. Plague, famine, war and natural disasters were God's punishment for the sins committed by man, sins which Protestants tended to view as collective to a much greater extent than the Catholics did. As a consequence, astrology became a commonplace element in Protestant penitence sermons, as well as in the recur-

⁷¹ Warwick, *Om Pest: En liden og nyttig undervisning i hvorledes man skal beskytte og helbrede sig selv* (1577), in *Pest Over Europa: Fire Danske Pestskrifter*, ed. Anna-Elisabeth Brade (Copenhagen: Medicinsk-Historisk Museum, 1999), p. 47. That the plague and other diseases were a divine punishment formally caused by the influences of the heavenly bodies was a notion repeated in virtually every medical text in the sixteenth century. For some examples, see Benedictus Olai, *Een nyttigh Läkere Book* (Stockholm, 1578), sigs. O2^v-O3^r; and Simon Berchelt, *Om Pestilentzien och hennes orsaker* (Stockholm, 1589), sigs. A3^v, A8^v.⁷² Scribner, "Reformation and Desacralisation: from Sacramental world to Moralised Universe", in *Problems in the Historical Anthropology of Early Modern Europe*, ed. R. Po-Chia Hsia and R. W. Scribner (Wiesbaden: Harrassowitz Verlag, 1997), pp. 75-92. For a more exhaustive critique of the Weberian view of the Reformation, see also Scribner, "The Reformation, Popular Magic and the 'Disenchantment of the World'", *Journal of Interdisciplinary History* 23 (1993), pp. 475-494.

⁷² Scribner, "Reformation and Desacralisation: from Sacramental world to Moralised Universe", in *Problems in the Historical Anthropology of Early Modern Europe*, ed. R. Po-Chia Hsia and R. W. Scribner (Wiesbaden: Harrassowitz Verlag, 1997), pp. 75-92. For a more exhaustive critique of the Weberian view of the Reformation, see also Scribner, "The Reformation, Popular Magic and the 'Disenchantment of the World'", *Journal of Interdisciplinary History* 23 (1993), pp. 475-494. —

rent decrees of intercession days following the appearance of comets, eclipses and conjunctions in the latter half of the sixteenth century. In Sweden, King Johan III repeatedly issued such decrees, stating that “so many terrible signs of wonder have been seen in the heavens and on earth, by which God undoubtedly proclaims His wrath and coming punishment”. By making penance, God’s anger and the power of the heavens could be averted, implying that man always had the ability to affect God’s will – and hence the course of history.⁷³

But despite the determinism inherent in Brahe’s astrology, effectively precluding such a view, his ideas contained an aspect on a par with Lutheran conceptions. To Brahe, as to Protestants in general, the strange events of the sixteenth century could only be interpreted and rendered intelligible in the light of an apocalyptic view of history. Christian eschatology provided the interpretive framework through which the world could be understood and the events gained a meaning. The works of Brahe provide an illustrative example of how this interpretive framework could be applied in early modern science to attribute an apocalyptic dimension to natural phenomena, a dimension of meaning linking theological and scientific discourses to each other and thereby having a fundamental part in shaping early modern scientific knowledge.

In this respect Brahe can be seen as representing a view of science in which religious conceptions constituted a fundamental element, an element which in recent decades has emerged as one of the most important to understand early modern scientific culture. As Charles Webster once remarked: “...throughout the Scientific Revolution, Christian eschatology provided an undiminishing incentive towards science, if not a primary motivating factor”. To a number of the most well-known figures in the history of science, the ideological roots of science did not reside in the aspiration to free knowledge from Church and religion, but in the words of the prophet Daniel, stating that “knowledge shall be increased” in the Last Days – a knowledge that would ultimately turn the chiliastic dream of an earthly paradise true. Nor did these scientists regard the flourishing of science as a new event in human history; to them, the “Scientific Revolution” represented a gradual restoration of the consummate knowledge which the biblical sages had once been in possession of. When Francis Bacon talked about the *instauratio* of science – a term he probably borrowed from Brahe – it was in the sense of a renewal, a restoration, a revival of the wisdom that man had had at the beginning of time. Indeed, the term *instauratio* had distinctly religious and apocalyptic connotations: in the Vulgate the word is used in some dozen passages referring to the restoration of Jerusalem

⁷³ On the important role of astrology in Protestant religious propaganda, see Dixon, “Popular Astrology and Lutheran Propaganda in Reformation Germany”, *History* 84 (1999), pp. 403–418, and Barnes, “Hope and Despair in Sixteenth-Century German Almanacs”. The decree of Johan III is quoted from Emanuel Linderholm, “Om kometernas religiösa tolkning i äldre tider: studier till 1500- och 1600-talens naturåskådning”, *Bibelforskaren* 1910, p. 232.

at the End of Times and the Golden Age when David and Solomon reigned. This usage was later codified by Augustine and Thomas Aquinas and turned fundamental to the later meaning of the word. As Charles Whitney has emphasized, Bacon's intention with *Instauratio magna* (1620) was not merely to lay the foundation of a scientific programme, but to initiate a period of scientific progress culminating in the apocalypse.⁷⁴

Whether Brahe shared this view of science and of its important role in the last phase of human history is uncertain, but in his works he expressed a conception of history in all respects in keeping with the Renaissance notion of a *philosophia perennis* or "ancient wisdom". Astronomy, he claimed, was the most noble and ancient of sciences, "imparted by God to mankind at the time of Adam". From Adam's son Seth this knowledge had been handed down from generation to generation, via Abraham to the Egyptians, from whom it had subsequently reached the Greeks and Romans. But as he pointed out, only works of classical antiquity had survived, a gap in our cultural heritage implying that the original, divinely revealed knowledge was lost – at least until he began "restoring it to health".⁷⁵

Thus, it may not have been pure happenstance that Brahe closed his *Astronomiae instauratae progymnasmata* – "Introduction to a restored astronomy" – with his most exhaustive prophetic account, a chiliastic vision of the coming Golden Age. For if Brahe was conscious of the religious significance of the term *instauratio* it is quite possible that this chapter was an allusion to the role he himself played in this ongoing cosmic drama, a gentle hint that the circle of history was closing and that the gate to the Golden Age had finally been opened by his – and only his – scientific work.

⁷⁴ The classic work is Charles Webster's *The Great Instauration: Science, Medicine and Reform 1626-1660* (London, Duckworth, 1975); regarding the use of Daniel 12:4, see in particular pp. 9-12. The quote is to be found in his *From Paracelsus to Newton: Magic and the Making of Modern Science* (Cambridge: Cambridge University Press, 1982), p. 48. On Francis Bacon's use of the term *instauratio*, see Charles Whitney, "Francis Bacon's *Instauratio*: Dominion of and over Humanity", *Journal of the History of Ideas* 50 (1989), pp. 371-390, and Stephen A. McKnight, "The Wisdom of the Ancients and Francis Bacon's *New Atlantis*", in *Reading the Book of Nature: The Other Side of the Scientific Revolution*, ed. Allen G. Debus and Michael T. Walton (Kirksville, Mo.: Sixteenth Century Journal Publications, 1998), pp. 91-109. For an illustrative example of the theological meaning of the term *instauratio*, see Ephesians 1:10, describing how Christ at the consummation of time "restores" – *instaurare* – the entire creation: "in dispensationem plenitudinis temporum instaurare omnia in Christo quae in caelis et quae in terra sunt in ipso".

⁷⁵ Brahe, *Astronomia instauratae mechanica*, in *Opera omnia*, vol. V, pp. 5, 87, and *De disciplinis mathematicis oratio*, in *Opera omnia*, vol. I, pp. 148-149. For a fuller discussion of the Renaissance conception of *philosophia perennis* and how it made natural philosophy and theology mutually dependent, see Håkan Håkansson, *Seeing the Word: John Dee and Renaissance Occultism* (Lund: Minerva, 2001), especially pp. 109-119.