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*Meotod*, the Meteorologist: Celestial Cosmography in  
*Christ and Satan*, lines 9-12a

Miranda Wilcox

*Christ and Satan*, the last poem in Oxford, Bodleian Library, MS Junius 11, begins with an eighteen-line description of the creation of the universe in which Christ constitutes the physical and temporal elements of heaven and earth. The first six lines of *Christ and Satan* imagine a cosmographic map as the Creator frames the dimensions of the cosmos formed out of the four elements:

þæt wearð underne eorðbuendum,  
þæt meotod hæfde miht and strengðo  
ða he gefestnade foldan sceatas.  
Seolfa he gesette sunnan and monan,  
stanas and eorðan, stream uton sæ,  
wæter and wolcn, ðurh his wundra miht.<sup>1</sup>

[It became clear to the earth-dwellers that the Creator had might and strength when he established the corners of the land. He himself fixed the sun and moon, stones and earth, the Ocean outside the sea, water and cloud, through the might of his wondrous powers.]

The poet notably diverges from the chronology of creation as recounted in the first chapter of Genesis. The poetry instead echoes allusions to the creation and cosmological images in sapiential books of the Bible, especially Psalms and Job.<sup>2</sup> Although expressed in vernacular renditions of biblical language, the cosmic structures in the prologue are imagined according to a model of the universe in the hybrid cosmology developed by patristic exegetes who syncretised Hebraic scriptural accounts of creation with Hellenistic astronomy and physics.<sup>3</sup> Early Latin Christian scholars applied an exegetic methodology driven by the

'handmaiden' attitude to secular learning, namely an attitude that 'secular disciplines, especially natural philosophy and science, should not be studied for their own sakes, but only to understand and explicate holy scripture and theology.'<sup>4</sup> One of the most significant areas in which patristic exegetes turned to the dominant theories of the origins and mechanics of the world in Greek natural philosophy was in explications of scriptural accounts of creation.<sup>5</sup>

The next two lines of *Christ and Satan* provide an example of the assimilation of Greek astronomy with the scriptural narrative of the creation of the celestial regions. Lines seven and eight locate the planet earth in relation to other heavenly bodies:

Cleowne ymb lyfte clene ymbhaldað  
meotod on mihtum, and alne middangeard.<sup>6</sup>

[The Creator in his might entirely supports the sphere around the air, and all middle-earth.]

Emily Thornbury recently suggested emendations to these lines which allude to the theory that 'the heavens were structured in a series of concentric spheres surrounding the earth, the lowest of which was the air breathed by living creatures.'<sup>7</sup> Greek natural philosophers, as early as the fifth century BC, proposed models of a geocentric universe comprised of revolving nested homocentric spheres.<sup>8</sup> Patristic exegetes adopted the general concept of the sphericity of the universe in their hexaemeral commentaries without delving into the complex mathematics of various configurations of epicycles and eccentrics that explained planetary motion. As Christianity spread through Western Europe, these patristic commentaries became authoritative texts for medieval Christians, and when patristic cosmology was codified by Latin encyclopedists it became the orthodox Christian worldview.

The next four lines provide an example of the syncretism inherent in much of the patristic cosmology and the main focus of this paper. These lines situate the creator, who is Christ, as inhabiting heaven, a cosmic region which has its own geographic features distinct from earth, but not so distant as to prevent Christ from gazing on the terrestrial regions and controlling terrestrial weather:

he selfa mæg sæ geondwlitan,  
grundas in heofene, godes agen bearn.  
and he ariman mæg rægnas scuran,

dropena gehwelcne.<sup>9</sup>

[He himself is able to see through the sea, the foundation in heaven, God's own Son, and he is able to count the showers of rain, each of the drops.]

The image of an aqueous and solid barrier between the celestial and terrestrial regions in lines nine and ten caused confusion for the poem's modern editors, especially those of the late nineteenth and early twentieth century. The manuscript reading of 'grundas in heofene' seemed particularly nonsensical; how could there be *grundas* in heaven, and how could Christ see through such *grundas*? In 1857, Christian W. M. Grein suggested emending 'heofene' to 'geofene' (ocean) rendering the line, as a subsequent editor M. D. Clubb translated it, to mean 'he can see through the ocean, the very bottom of the deep'.<sup>10</sup> Grein's emendation was adopted by subsequent editors: Friedrich Graz, Peter J. Cosijn, M. D. Clubb, and George Philip Krapp.<sup>11</sup> The most recent editor, Robert Finnegan, argues against this emendation after concluding that the manuscript reading of *heofen* describes 'the ability of *godes agen bearn* to look *through* the sea to the foundations of creation, which foundations are set in heaven.'<sup>12</sup> I argue further that the manuscript reading 'grundas in heofene' in line ten provides the key to recognizing lines nine through twelve as a perfectly sound explanation of the transparent firmament and the celestial ocean, two key elements in patristic cosmography. The firmament or *grundas* was imagined as a solid spherical boundary that separated the celestial waters or *sæ* from the earth's atmosphere and prevented the earth from being flooded by the celestial waters except when Christ permitted rain to fall as described in lines eleven and twelve.

The concept of the firmament and celestial waters reveal the considerable effort and ingenuity that early Christian exegetes made to harmonize the model of the universe portrayed by divine authority in scripture with the scientific authority of contemporary Hellenistic cosmologies. Fourth- and fifth-century Christian exegetes of Genesis, namely Basil, Ambrose, and Augustine, discovered a remarkably consistent cosmographic model throughout the Old Testament. A modern biblical commentary summarizes:

The ancient Hebrews imagined the world as flat and round, covered by the great solid dome of the firmament which was held up by mountain pillars (Job 26. 11; 37. 18). Above the firmament and under the earth was water, divided by God at creation (Genesis 1. 6, 7; cf. Psalms 24. 2; 148.

4). The upper waters were joined with the waters of the primordial deep during the Flood; the rains were believed to fall through windows in the firmament (Genesis 7. 11; 8. 2). The sun, moon, and stars moved across or were fixed in the firmament (Genesis 1. 14-19; Psalms 19. 4, 6).<sup>13</sup>

The creation of the firmament is described in Genesis 1. 6-7; God divides the waters above and below a *firmamentum* in all known versions of the Vetus Latina, a *stereoma* in the Septuagint, and a *raqia* in the Hebrew Bible.<sup>14</sup> The Bible provides almost no explanation of what the firmament is aside from its name. In Classical Latin, a *firmamentum* was 'a strengthening, support, prop', an appropriate word to render Greek *stereoma* 'a solid body', which in turn rendered the problematic Hebrew *raqia* in terms of its verbal definition in Syriac, 'to strengthen'.<sup>15</sup>

The concept of a firmament was easily adapted by Basil, followed by Ambrose and Augustine, to align with prevailing Aristotelian astronomy; the firmament was considered the boundary or lowest level of the outermost sphere of the heavens, usually called the sphere of the fixed stars, in a universe composed of seven or eight concentric spheres rotating around Earth.<sup>16</sup> However, the presence of waters existing above the firmament was harder to explain in terms of Greek physics.

Basil, Ambrose, and Augustine struggled to reconcile the biblical insistence of the presence of waters in the heavens above the firmament with the Greek doctrine of the relative weights and positions of the four elements and with the Stoic conception of fiery heavenly spheres.<sup>17</sup> According to Greek physics, the heaviest elements (earth and water) were drawn downwards by their weight and the lighter (air and fire) were drawn upwards by their lightness; thus, the universe's equilibrium would not be maintained if there was water in the fiery and airy heavens.<sup>18</sup>

In his third Lenten homily based on the book of Genesis, Basil argued that the waters above the firmament were necessary to regulate the temperature of the universe; the waters provided a cooling buffer between the earth and the burning sun and other igneous heavenly bodies.<sup>19</sup> For Basil, the firmament was not solid but firmer than the lighter and fiery substances in the celestial regions and, like a valve, steadily filtered the celestial waters to earth as rain through the firmament to moderate the temperature produced by heavenly fires.<sup>20</sup>

Ambrose transmitted a generalized explanation of Basil's theory that the waters above the firmament acted as a coolant for the fiery heavenly

constellations. In his *Exameron*, rain on earth originates from these celestial waters:

in caelo, cum sit ignitus et micans fulgentibus stellis polus, aqua esse possit intellegi, quae uel supra caelum est uel de illo superiore loco in terram largo frequenter imbre demittitur.<sup>21</sup>

[Since the pole is fiery and glitters with shining stars, in heaven there might be understood to be water, which is either above the heaven or from that high position falls frequently to earth in a heavy rain shower.]

Ambrose further elaborates how the waters above heaven reveal the grand cosmic balance:

ideoque pondere et mensura examinavit uniuersa; numerata enim sunt ei et stilicidia pluuiarum, sicut in libro Job legimus. sciens uel rerum facilem defectum fore uel solutionem uniuersitatis, si alterum exsuperaretur altero, ita utriusque temperauit dispendia, ut neque plus ignis exquoqueret neque exuberaret aqua quam inminutio fieret utriusque moderata, quae et superfluum detraheret et necessarium reseruaret.<sup>22</sup>

[And thus God balanced all things with weight and measure; even the drops of rain are numbered by him, as we read in the book of Job. Knowing that either there would be a tendency toward a failure of things or a dissolution of the universe if one element was dominated by the other, thus he tempered the imbalances of each so that neither would the fire consume nor the water drown, more than what would be an appropriate measure in each, so as to remove the excess and retain what was essential.]

The interaction between the super-celestial waters and the firmament in Ambrose's conception of the universe is not just as a temperature regulator but a fundamental process that contributed to the grand cosmic balance of its design.

Augustine was more hesitant to adopt theories of classical astronomy than either Basil or Ambrose, especially when they contradicted the scriptural account.<sup>23</sup> In *De Genesi ad litteram* II. i-viii, Augustine rejects the argument that the universe was ordered by God's capricious omnipotence; instead, he argues that God's creation is ordered by physical principles that we can discern if we stretch our reason to understand their proper natures.<sup>24</sup> Augustine reviews the

doctrine of the ordering of elements by weight and suggests that there could be water above the firmament in the rarified form of vapor, which is lighter than air and heavier than the fiery heaven; such a conception would not challenge the Hellenistic theory of elemental weights nor Genesis 1. 6-8.<sup>25</sup>

The cosmographic explanations of Basil, Ambrose, and Augustine were summarized and standardized in one of the most widely consulted medieval handbooks of natural philosophy: Isidore's *De natura rerum*. By the sixth century, the debate about celestial waters between Christians, who claimed the Bible as their authority, and their secular peers, who claimed Greco-Roman science as their authority, had ceased; Isidore presents the synthesis of scripture and astronomy as the accepted worldview without contradiction. Although his cosmological summaries are still fraught with inconsistencies, these inconsistencies were not to be reevaluated and revised until the tenth through thirteenth centuries, when Arabic and Greek Aristotelian astronomical texts became available in Western Europe.<sup>26</sup> Isidore described *caelum*, heaven, as

rotundum, volubile, atque ardens esse dixerunt. Cuius sphaeram super aquas esse putaverunt, ut in ipsis volvatur, eiusque incendium temperent.<sup>27</sup>

[rounded, spinning, and burning. They thought that its sphere was above the waters, so that as it is rolled [in circuit] on them they would temper its burning.]

He explains the mechanics in greater detail in chapter XIII:

Cuius quidem coeli naturam artifex mundi deus aquis temperavit, ne conflagratio superioris ignis inferiora elementa succenderet. Dehinc circulum inferioris coeli, non uniformi, sed multiplici motu solidavit, nuncupans eum firmamentum propter sustentationem superiorum aquarum.<sup>28</sup>

[The creator of the world, God, certainly tempered the nature of this heaven with waters, so that the burning of higher fire would not set the lower elements on fire. Then he made the circle of the lower heaven, not having one zone but multiple zones, solid by motion, calling it the firmament because it supports the higher waters.]

For Isidore, the waters above the heavens formed a cooling layer that protected the material world from the empyrean fire of the spiritual realms.<sup>29</sup>

Two Irish treatises written in the seventh century, *De mirabilibus sacrae scripturae* by the 'Irish Augustine' and *Liber de ordine creaturarum*, reveal a strong insular interest in celestial cosmology.<sup>30</sup> These treatises probably relied exclusively on Augustine's *De Genesi ad litteram* and the Bible for their conception of the firmament, celestial waters, and theories of rainfall. The Irish scholars were intrigued by the possibility that the celestial waters were created as reserves for the Flood.<sup>31</sup> With this premise, they considered two alternatives: either the waters returned above the firmament after the Flood, and the usual pattern of rainfall continued; or there had been no rainfall before the Flood, and the water that fell from the firmament during the Flood became the source for the current pattern of evaporation and rainfall in the terrestrial atmosphere.<sup>32</sup>

In the early eighth century, Bede adapted much from Isidore's *De natura rerum* in his own popular scientific treatise, *De natura rerum*, as well as in his commentary on Genesis, *In Genesim*.<sup>33</sup> Bede also drew on the Irish *Liber de ordine creaturarum*, Basil, Augustine, Ambrose, as well as Pliny, and he distilled their commentaries into concise summaries. In his commentary on Genesis, Bede references Basil's comparison between the purity, solidity, and transparency of *crystallinus lapidis*, crystalline rock, which was thought to have been made from congealed waters, and the 'solidified substance of waters in the firmament of heaven' (*firmamentum caeli substantiam solidarit aquarum*).<sup>34</sup> Bede also quotes Ps. Clement via Rufinus's translation regarding the formation of the firmament on the second day of creation:

Iam uero aqua quae erat intra mundum in medio primi illius caeli terraeque spatio, quasi gelu concreta et crystallo solidata distenditur. Et huiusmodi firmamento uelut intercluduntur media caeli ac terrae spatia idque firmamentum caelum conditor appellauit, antiquioris illius uocabulo nuncupatum, et ita totius mundi machinam cum una domus esset in duas diuisit regiones.

[Now, indeed, the water which was within the world in the middle of the space between that first heaven and earth is expanded, hardened like ice and solidified like crystal. And the middle region of heaven and earth is shut off as it were by a firmament of this kind, and the Creator called this firmament 'heaven', so-called from the name of that older one, and thus



he divided the fabric of the whole world, although it is one structure into two regions.]<sup>35</sup>

Bede addresses the function of the firmament and celestial sea in *De natura rerum*:

VII. De caelo superiore: Caelum superioris circuli proprio discretum termino et aequalibus undique spatiis collocatum uirtutes continet angelicas. [...] Hoc Deus aquis glacialibus temperavit ne inferiora succenderet elementa. Dehinc inferius caelum non uniformi sed multiplici motu solidavit, nuncupans illud firmamentum propter sustentationem superiorum aquarum.

VIII. De aquis caelestibus: Aquas super firmamentum positas, caelis quidem spiritalibus humiliores sed tamen omni creatura corporali superiores, quidam ad inundationem diluuii seruatatas, alii uero rectius ad ignem siderum temperandum suspensas adfirmant.<sup>36</sup>

[Concerning the higher heaven: heaven, separated by the particular boundary of the higher circle and positioned with equal intervals on both sides, has angelic Powers. [...] God tempered this place with icy waters so that the lower elements would not be set on fire. Henceforth the lower heaven was not strengthened by uniform motion but by multiple motions; it is called the firmament on account of its support of the higher waters. Concerning the celestial waters: some affirm that waters were positioned over the firmament, indeed lower than the spiritual heavens but yet higher than every corporeal creature, indeed they were reserved for the inundation of the Flood, but others say more correctly that they were suspended to temper the fire of the stars.]

Bede's *De natura rerum* became the standard textbook of natural history for generations; multiple manuscripts were produced and circulated in the Carolingian Empire and late Anglo-Saxon England.<sup>37</sup> Surviving manuscripts, references in Anglo-Saxon library catalogues, and citations by Anglo-Latin authors suggest that Ambrose's *Exameron*, Augustine's *De Genesi ad litteram*, and Isidore's *De natura rerum* were known in England during the Anglo-Saxon period.<sup>38</sup> However, to pinpoint any one as the single source for *Christ and Satan* would be impossible; it is more likely that the patristic cosmology portrayed in

these texts would have been dispersed widely enough to have been the accepted world view among educated Anglo-Saxon Christians.

So prevalent was the patristic cosmological model in the early Middle Ages that its circulation was not limited to just medieval scientific and exegetical treatises, the model was also transmitted through liturgy. The first two stanzas of the hymn *Inmense caeli conditor* of the New Hymnal articulate the cosmographic details outlined above:

Inmense caeli conditor;  
Qui, mixta ne confunderent,  
Aquaе fluenta dividens  
Caelum dedisti limitem

Firmans locum caelestibus  
Simulque terrae rivulis,  
Ut unda flammas temperet,  
Terrae solum ne dissipet.

[Infinite creator of the sky, you who divided the floods of water in two so that they should not mix and cause confusion and who set the sky as a boundary, establishing a place both for the streams of heaven and those of the earth so that the water might mitigate the flaming solar heat and might not dissolve the soil of the earth.]<sup>39</sup>

In this hymn, the Creator separates the terrestrial and celestial waters, and the celestial waters regulate the temperature of the fiery heavens.

*Inmense caeli conditor* was sung on Mondays at Vespers; it was the first in the weekly cycle of hexaemeral hymns sung at Vespers. The hexaemeral Vespers hymns were not part of the Old or Frankish Hymnals.<sup>40</sup> The first manuscript evidence of this hymn cycle appears in the earliest New Hymnals, which were produced on the continent in the ninth century.<sup>41</sup> The New Hymnal most likely developed into a core of forty-one hymns during the period of Carolingian liturgical reform led by Benedict of Aniane during the reign of Louis the Pious (813-40).<sup>42</sup> Changes in Carolingian liturgy occurred at the same time as a renewed Carolingian interest in astronomy, in particular the geometrical models of the celestial spheres found in Macrobius, Pliny, Martianus Capella, and Calcidius.<sup>43</sup> The hymn *Inmense caeli conditor* appears first in this milieu of liturgical and scientific innovation and can be traced to two psalters which were

compiled with additional liturgical material at St. Gall and Trier in the first half of the ninth century.<sup>44</sup>

While it is difficult to determine how early the Carolingian liturgical and scientific innovations spread to England, there is ample evidence of reciprocal transmission of scholarship across the English Channel throughout the Anglo-Saxon period. The earliest extant Anglo-Saxon manuscript of the New Hymnal dates from the end of the tenth century.<sup>45</sup> The Vespers hymn cycle occurs in all five of the extant Anglo-Saxon hymnals; these hymnals, compiled in the tenth and eleventh centuries, served both Benedictine monasteries and cathedral canons.<sup>46</sup> *Immense caeli conditor* has an interlinear Old English gloss in the eleventh-century Durham Hymnal, but there is not a close relationship between the vocabulary of the hymn gloss and *Christ and Satan*.<sup>47</sup> Again, it is impossible to claim that *Immense caeli conditor* was a source for *Christ and Satan*; yet the hymn shows that Anglo-Saxon monks living in the late-tenth and eleventh centuries would only have had to participate in the Office to learn patristic cosmography.

Let us now return to *Christ and Satan* in light of patristic conceptions of the firmament and celestial waters. The poem articulates the essential characteristics of the patristic cosmic model: the *sæ* in line nine is the celestial sea which functioned as celestial coolant above the firmament and as a reservoir for terrestrial rain showers, and the *grundas in heofene* in line ten is the firmament, the solid spherical boundary that separates the celestial waters from the earth's atmosphere. From his heavenly position of glory, Christ can see through the transparent firmament to the terrestrial world below.<sup>48</sup> The raindrops in line eleven result when the celestial sea leaks through the sluices of the firmament upon Christ's command. The manuscript reading *grundas in heofene* should not be emended to *grundas in geofene*; such an emendation would obscure the cosmographic images in *Christ and Satan*.

The final lines of the prologue to *Christ and Satan* complete the cosmological model; Christ establishes the temporal cycles of the universe, an appropriate corollary to the construction of the physical framework of the universe:

Daga enderim  
seolua he gesette þurh his soðan miht.  
Swa se wyrhta þurh his wuldres gast  
serede and sette on six dagum  
eorðan dæles, up on heofonum,

and heanne holm.<sup>49</sup>

[He himself set the number of days through his true power. Thus the Maker planned and established through the spirit of his glory in six days the portions of earth, up in the heavens, and the sea below.]

These lines, like the rest of the prologue, echo the sapiential language of the Old Testament.

Creation is complete after Christ orders the physical and temporal aspects of the cosmos. The description of the creation of the cosmos ends with a question that emphasizes the ineffability of God's omniscient and creative power:

Hwa is þæt ðe cunne  
orðonc clene nymðe ece god?<sup>50</sup>

[Who is there who knows the artifice entirely except external God?]

In spite of the rhetorical nature of the question, there is a certain degree of irony that the poet has tried to do this very thing—understand the mechanics and structure of God's creation—by articulating cosmographic images borrowed from patristic cosmology, a syncretic model which was developed in the scriptural exegesis of Basil, Ambrose, Augustine, and seventh-century Irish monks, codified in scientific handbooks by Isidore and Bede, and authorized in the liturgy. Perhaps the question can be rephrased for the modern scholar: who can appreciate the poet's artifice except someone who has explored the cultural context of the poet's perception of the cosmos?<sup>51</sup>

NOTES

<sup>1</sup> *Christ and Satan*, lines 1-6. Except where noted, the text follows *The Junius Manuscript*, ed. by George Philip Krapp, ASPR 1 (New York: Columbia University Press, 1931), pp. 133-58. In line five, I follow the reading of T. D. Hill, 'Apocryphal Cosmography and the "stream uton sæ": a note on "Christ and Satan", lines 4-12', *Philological Quarterly*, 48 (1969), 550-54.

<sup>2</sup> See notes in *Christ and Satan, An Old English Poem*, ed. by M. D. Clubb (New Haven: Yale University Press, 1925), pp. 45-50.

<sup>3</sup> For an overview of early medieval cosmology, see Philip Grierson, 'The European Heritage', in *Ancient Cosmologies*, ed. by C. Blacker and M. Loewe (London: Allen & Unwin, 1975), pp. 225-58. A more recent study by Barbara Obrist, *La cosmologie médiévale. Textes et images*, vol. 1: *Les fondements antiques* (Florence: Edizioni del Galluzzo, 2004), traces the transmission of Greco-Roman mathematical astronomy through the early Middle Ages; Obrist does not address the syncretism of biblical cosmology with the Greco-Roman science in Christian patristic exegesis.

<sup>4</sup> Edward Grant, *Science and Religion: From Aristotle to Copernicus* (Baltimore: John Hopkins University Press, 2006), p. 105; see also pp. 111-14.

<sup>5</sup> Grant, *Science and Religion*, pp. 114-35.

<sup>6</sup> *Christ and Satan*, ll. 7-8. I follow Emily Thornbury's emendations and translation of these lines in her 'Christ and Satan: "Healing" Line 7', *English Studies*, 87 (2006), 505-10.

<sup>7</sup> Thornbury, 'Christ and Satan', p. 508.

<sup>8</sup> Obrist, *La cosmologie médiévale*, pp. 53-140, 293-96. See also M. R. Wright, *Cosmology in Antiquity* (London: Routledge, 1995), pp. 83-85, 148-62, 179.

<sup>9</sup> *Christ and Satan*, ll. 9-12a. See the digital version of Oxford, Bodleian Library, MS Junius 11, p. 213 at the Bodleian Library, *Early Manuscripts at Oxford University*, <<http://image.ox.ac.uk/show?collection=bodleian&manuscript=msjunius11>>, [accessed 20 September 2007]. The eleventh-century West Saxon Corrector changes *se* in line nine to *sæ* and *heofene* in line ten to *heofenon*.

<sup>10</sup> Christian W. M. Grein, *Bibliothek der Angelsächsischen Poesie*, 3 vols (Göttingen: Wigand, 1857), I, p. 130; *Christ and Satan*, ed. by Clubb, p. 48.

<sup>11</sup> For an overview of the history of the emendation, see *Christ and Satan*, ed. by Clubb, p. 48, and *The Junius Manuscript*, ed. by Krapp, p. 231.

<sup>12</sup> *Christ and Satan: A Critical Edition*, ed. by R. E. Finnegan (Waterloo: Wilfrid Laurier University Press, 1977), p. 91. C. R. Sleeth also maintains the manuscript reading in *Studies in Christ and Satan* (Toronto: University of Toronto Press, 1982).

<sup>13</sup> *The HarperCollins Bible Dictionary*, ed. by Paul J. Achtemeier (San Francisco: HarperCollins, 1996), p. 339.

<sup>14</sup> *Vetus Latina: Die Reste der allateinischen Bibel*, ed. by Petrus Sabatier and Archabbey of Beuron (Freiburg: Verlag Herder, 1949-), II: *Genesis*, ed. by Bonifatius Fischer (1951), pp. 10-12.

<sup>15</sup> Charlton T. Lewis and Charles Short, *A Latin Dictionary* (Oxford: Clarendon Press, 1879; repr. 2002), p. 752. Henry George Liddell and Robert Scott, *A Greek-English Lexicon* (New York: Harper, 1889), p. 1427. On the difficulties of translating *raqia*, see H. Torczyner, 'The Firmament and the Clouds, *raqia* and *shehaqim*', *Studia Theologica* 1 (1948), 188-96 (p. 189). Ambrose offers additional etymologies in *Exameron*, ed. by K. Schenkl, CSEL 32.1 (Vienna, 1897), II.iv.15 (pp. 54-55).

<sup>16</sup> Basil, *Hexaameron*, III is translated into Latin by Eustathius, *Ancienne version Latine des neuf Homélie sur l'Hexaéméron de Basil de Césarée*, ed. by Emmanuel Amand de Mendieta and Stig Y. Rudberg (Berlin: Akademie-Verlag, 1958), pp. 31-45. Ambrose, *Exameron*, I.vi (pp. 16-23), II.iii-iv (p. 46-59). Augustine, *De Genesis ad litteram*, ed. by J. Zycha, CSEL 28.1 (Vienna, 1894), II.i-x (pp. 32-48).

<sup>17</sup> Thomas O'Loughlin, 'Aequae super caelos (Gen 1:6-7): The First Faith-Science Debate?', *Milltown Studies*, 29 (1992), 92-114. See also Marina Smyth, *Understanding the Universe in Seventh-Century Ireland* (Woodbridge: Boydell, 1996), pp. 94-225.

<sup>18</sup> For an overview of Aristotle's concept of elemental weights, see James E. McClellan and Harold Dorn, *Science and Technology in World History* (Baltimore: John Hopkins University Press, 2006), pp. 73-76.

<sup>19</sup> Basil, *Hexaameron*, III.v (pp. 37-38).

<sup>20</sup> Basil, *Hexaameron*, III.vii-viii (pp. 40-43).

<sup>21</sup> Ambrose, *Exameron*, I.vi.20 (p. 17, ll. 7-11).

<sup>22</sup> Ambrose, *Exameron*, II.iii.12 (p. 51, ll. 7-14). Compare to Basil, *Hexaameron*, III.v.

<sup>23</sup> For an overview of Augustine's cosmography, see Leo C. Ferrari, 'Augustine's Cosmography', *Augustinian Studies*, 27 (1996), 129-77.

<sup>24</sup> Augustine, *De Genesis ad litteram*, II.i (pp. 32-35).

<sup>25</sup> Augustine, *De Genesis ad litteram*, II.ii-x (pp. 35-48). See also his *Retractiones*, ed. by Almut Mutzenbecher, CCSL 57 (Turnhout: Brepols, 1984), II.vi.2 (p. 94, ll. 17-19).

<sup>26</sup> Stephen C. McCluskey, *Astronomies and Cultures in Early Medieval Europe* (Cambridge: Cambridge University Press, 1998).

<sup>27</sup> Isidore, *De natura rerum*, XII (PL 83, col. 984).

<sup>28</sup> Isidore, *De natura rerum*, XIII (PL 83, col. 986-987). See also Isidore, *De natura rerum*, XIV (PL 83, col. 987).

<sup>29</sup> Isidore, *De natura rerum*, XII-XIV (PL 83, col. 981-987). See Thomas O'Loughlin, 'The Waters Above the Heavens: Isidore and the Latin Tradition', *Milltown Studies*, 36 (1995), 104-17.

<sup>30</sup> *De mirabilibus sacrae scripturae*, ed. and trans. by F. P. MacGinty (unpublished doctoral dissertation, National University of Ireland, 1971). *Liber de ordine creaturarum*, ed. and trans. by M. C. Díaz y Díaz (Santiago de Compostela: Universidad de Santiago de Compostela, 1972), iii-iv (pp. 100-10). For an analysis of seventh-century Irish cosmology, see Smyth, *Understanding the Universe*.

<sup>31</sup> *De mirabilibus sacrae scripturae*, I.vi (pp. 23-28); *Liber de ordine creaturarum*, III.v (p. 102-04).

<sup>32</sup> *De mirabilibus sacrae scripturae*, I.vii (pp. 28-32). In spite of the meteorological role of the celestial waters, Augustine, Isidore, Irish commentators, and Bede observed that rain also resulted when small particles of moisture coalesced into clouds and became sufficiently heavy; see Bede, *De natura rerum*, ed. by C. W. Jones, CCSL 123A (Turnhout: Brepols, 1975), XXXIII (pp. 221-22). Riddle 3 (ll. 36-58) presents an additional meteorological model; see *The Exeter Book*, ed. by George Philip Krapp and Elliott Van Kirk Dobbie, ASPR 3 (New York: Columbia University Press, 1936), pp. 182-83. In 'Stoic Cosmology and the Source of the First Old English Riddle', *Anglia*, 112 (1994), 1-25, Michael Lapidge argues that the first three riddles in the Exeter book describe a unified conception of the Stoic cosmic force, *pneuma*.

<sup>33</sup> Bede, *De natura rerum*, V-VIII (pp. 196-200), and Bede, *In Genesim*, ed. by C. W. Jones, CCSL 118A (Turnhout: Brepols, 1968), I.241-324 (pp. 10-12).

<sup>34</sup> Bede, *In Genesim*, I.258-59 (p. 10).

<sup>35</sup> Bede, *In Genesim*, I.314-20 (p.12). Translation by Calvin B. Kendall, *On Genesis: Bede* (Liverpool: Liverpool University Press, 2008), pp. 77-78.

<sup>36</sup> Bede, *De natura rerum*, VII-VIII (pp. 197-99).

<sup>37</sup> C. W. Jones, 'Manuscripts of Bede's *De natura rerum*', *Isis*, 27 (1937), 430-440. W. M. Stevens, *Bede's scientific achievement* (Jarrow: Jarrow Lecture, 1985).

<sup>38</sup> Michael Lapidge, *The Anglo-Saxon Library* (Oxford: Oxford University Press, 2006), pp. 254-55, 279-80, 285, 310.

<sup>39</sup> *Inmense caeli conditor*, ll. 1-8. Edited and translated by I. B. Milfull, *The Hymns of the Anglo-Saxon Church: A Study and Edition of the 'Durham Hymnal'* (Cambridge: Cambridge University Press, 1996), pp. 145-47. Also edited in *Early Latin Hymns*, ed. by A. S. Walpole (Hildesheim: Olms, 1966), no. 74, pp. 281-82, and in *Analecta Hymnica Medii Aevi*, ed. by C. Blume and Guido M. Dreves, 55 vols (Leipzig: O. R. Reisland, 1886-1922), LI, no. 35, pp. 35-36.

*Celestial Cosmography in Christ and Satan, lines 9-12a*

<sup>40</sup> Helmut Gneuss, 'Latin Hymns in Medieval England: Future Research', in *Chaucer and Middle English Studies in Honour of Russell Hope Robbins*, ed. by Beryl Rowland (Kent: Kent State University Press, 1974), pp. 407-24 (p. 410), and 'Zur Geschichte des Hymnars', *Mittellateinisches Jahrbuch*, 35 (2000), 227-47 (p. 237).

<sup>41</sup> Gneuss, 'Zur Geschichte des Hymnars', pp. 239-40; Josef Szövérfy, *Die Annalen der lateinischen Hymnendichtung. Ein Handbuch*, 2 vols (Berlin: Schmidt, 1964-65), I, pp. 141-42.

<sup>42</sup> Gneuss, 'Zur Geschichte des Hymnars', pp. 235-43; Alice L. Harting-Corrêa, 'Make a merry noise! A ninth-century teacher looks at hymns', in *The Church and the Arts: Papers Read at the 1990 Summer Meeting and the 1991 Winter Meeting of the Ecclesiastical Historical Society*, ed. by Diana Wood (Oxford: Blackwell, 1995), pp. 79-86; Donald A. Bullough and Alice L. Harting-Corrêa, 'Texts, chant, and the chapel of Louis the Pious', in *Charlemagne's Heir, New Perspectives on the Reign of Louis the Pious (814-40)*, ed. by Peter Godman and Roger Collins (Oxford: Clarendon Press, 1990), pp. 489-508. For an overview of the Carolingian liturgical revival, see Ruth Ellis Messenger, 'Whence the Ninth Century Hymnal?', *Transactions and Proceedings of the American Philological Association*, 69 (1938), 446-64.

<sup>43</sup> Bruce Eastwood, *Ordering the Heavens: Roman Astronomy and Cosmology in the Carolingian Renaissance* (Leiden: Brill, 2007); Stephen C. McCluskey, *Astronomies and Cultures*, pp. 131-64; Bruce Eastwood and Gerd Graßhoff, *Planetary Diagrams from Roman Astronomy in Medieval Europe, c.a. 800-1500*, *Transactions of the American Philosophical Society*, vol. 94, pt. 3 (Philadelphia, 2004); and Obrist, *La cosmologie médiévale*, plates 1-118.

<sup>44</sup> St. Gall, Stiftsbibliothek, Codex Sangallen 20, pp. 361-62 is digitized at CESG: *Codices Electronici Sangallenses* <[http://www.cesg.unifr.ch/virt\\_bib/manuscripts.htm](http://www.cesg.unifr.ch/virt_bib/manuscripts.htm)> [accessed 9 June 2007]. Manchester, John Rylands Library, MS lat. 116, fols 95-97, is described in M. R. James, *A Descriptive Catalogue of the Latin Manuscripts in the John Rylands Library at Manchester* (Manchester: Manchester University Press, 1921), p. 214.

<sup>45</sup> Gneuss, 'Latin Hymns', pp. 410-11, 413, and 'Zur Geschichte des Hymnars', p. 241.

<sup>46</sup> See list of manuscripts in Milfull, *Hymns of the Anglo-Saxon Church*, pp. 145-47.

<sup>47</sup> Milfull reproduces the gloss in *Hymns of the Anglo-Saxon Church*, pp. 145-47.

<sup>48</sup> God is depicted as controlling the universe from His position above the firmament in Boethius's *De consolatione philosophiae*, ed. by L. Bieler, CCSL 94 (Turnhout: Brepols, 1957), IVm1 (p. 66, ll. 19-22); see the Old English renditions in *King Alfred's Old English Version of Boethius De Consolatione Philosophiae*, ed. by Walter Sedgefield (Oxford: Clarendon Press, 1899), 36.iv (p. 105, lines 3-28), and *Alfred's Metres of Boethius*, ed. by Bill Griffiths, rev. ed. (Middlesex: Anglo-Saxon Books, 1994), XXIV. 28-41 (pp. 122-25).

<sup>49</sup> *Christ and Satan*, ll. 12b-17a.

<sup>50</sup> *Christ and Satan*, ll. 17b-18.



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