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Ripples on the Water? The Acoustics of Geoffrey Chaucer's *House of Fame* and the Influence of Robert Holcot*

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The second book of Chaucer's dream-vision poem, *The House of Fame*, begins with the arrival of a huge golden eagle, who swoops down, seizes the dreaming poet in his claws, and carries him off skywards.[1] The bird eventually introduces himself as the envoy of "the god of thonder/ Which that men callen Jupiter" (608–609); and he explains he has been sent by Jupiter to take Chaucer to a place called "the House of Fame", where the poet will be able to overhear a marvellous profusion of all the various things ever spoken by or about lovers (lines 661–698). The Eagle clearly expects the poet to be delighted by this prospect of so privileged an insight into the experiences of "Loves folke" (675). However, as it turns out, Chaucer's persona in the poem flatly refuses to believe even in the existence of the House of Fame, frankly doubting that so many sounds could ever be collected in one place: "For hyt/ Were impossible," he insists, that Fame "shulde here al this" (701–705). Apparently rather piqued by this disappointingly unenthusiastic (and indeed rather ungracious) response, the Eagle is moved to try to prove that the existence of such a place is an

1 Geoffrey Chaucer, *The House of Fame*: ed. John M. Fyler, in *The Riverside Chaucer*, ed. Larry D. Benson (Boston: Houghton Mifflin, 1987), 347–73; ed. Nick Havely in *Geoffrey Chaucer: The House of Fame*, 2nd edition, Durham Medieval and Renaissance Texts (Toronto: Pontifical Institute of Mediaeval Studies, 2013). All quotations here from the *House of Fame* are from Havely's 2013 edition.

entirely logical deduction, not from any particular textual precedent (as the predominantly literary concerns of the poem up to this point might have led one to expect), but from the principles of acoustics. Rather than insisting on his authority as the ambassador of the gods, the Eagle apparently chooses to interpret Chaucer's scepticism about the possibility of so many sounds being gathered in one place as a challenge to his authority as a physicist. Accordingly, he seems to believe that if he can convince the poet (and perhaps implicitly the poet's readers) of his credibility as an expert on the laws of sound, then Chaucer's persona within the poem (and, by extension, we the readers of the poem) will also accept the reality of the House of Fame. Yet how convincing is the Eagle's lecture on acoustics meant to be? Are we really supposed to treat this lengthy disquisition within the context of a fantastic dream-vision as an up-to-date and scientifically accurate account of the mechanics of the natural world? In any case, what would the science of physics have looked like to an educated layman (like Chaucer) in the second half of the fourteenth century? What models of the principles of sound were actually available to him? And are any of the choices that the Eagle makes among them significant for our understanding of the horizons of Chaucer's scientific knowledge?

In the course of attempting to answer these broad questions, I am going to propose a new source for one of the key moments in the Eagle's lecture on acoustics, the analogy with ripples created by a stone thrown into a body of water (in Section III below). To be more precise, I will argue for the primary importance to this section of the *House of Fame* of a source which is not exactly 'new' – having long lurked at the fringes of Chaucerian scholarship's consciousness – but which has never been seriously considered as a decisive influence on the Eagle's analysis of

sound. This source is the *Wisdom*-commentary of the Dominican friar, Robert Holcot (ca. 1290–1349). It seems to me that the probable presence of this text in Chaucer's mind at this point in *The House of Fame* invites a fundamental reconsideration of the way in which the English poet received – and used for literary effect – ideas about natural science. In Section IV, I provide an account of the central, and perhaps even pivotal, position occupied by Holcot in the intellectual history of the fourteenth century. However, before even attempting to define Holcot's influence on the Eagle's acoustics, or to discuss the relevance of this to any assessment of Chaucer's indebtedness to fourteenth-century intellectual culture, it seems to me necessary to preface this with an account of what seem to be the prevailing assumptions about the sources of Chaucer's physics: in particular, the supposition that Chaucer's understanding of natural science is, in essence, so profoundly and conventionally 'Aristotelian' as to leave little room for the identification of any distinctively fourteenth-century contributions it (see Section I). Such assumptions have been challenged before, with Chaucer's physics being portrayed as much more 'cutting-edge' than is generally assumed, but only on the basis of arguments that have not been subjected to sufficient scrutiny (see Section II). The possibility of Holcot's direct influence on the Eagle's account of the principles of acoustics is perhaps most significant for what it tells us about how Chaucer mediated between these alternatives – in effect pretending to participate in the grand and venerable tradition of scientific speculation about the natural world only by making use of ideas that had already been given a distinct moral/rhetorical shape by a relatively near contemporary.

I. THE 'ARISTOTELIAN' EAGLE?

It might be useful to begin with a summary of what the Eagle actually says: how, that is, he goes about attempting to justify his claim to authority as a natural scientist. Everything in the universe, the Eagle argues, is governed by a principle of attraction, such that every object has a natural tendency, a "kyndely enclynynge", to move towards a particular point: a "kyndely stede" (729–36). So, for example, anything made of a heavy substance like stone or lead will always fall downwards once it is released (737–41), and conversely light things like fire or sound or smoke naturally move upwards, "seke upwarde on hight" (742–46). Similarly, every river is "enclyned" to run towards the sea; fish can only survive in water; and trees need to be rooted in the earth (747–52). What these instances illustrate, according to the Eagle, is the principle that every kind of thing has its own proper place in the universe: "every thinge, by thys reson,/ Hath his propre mansyon/ To which it seketh to repaire" (753–55); and he emphasises that this is an opinion familiar in "every philosophres mouthe", not just Aristotle and Plato, but also "other clerkys, many oon" (757–60). Speech, moreover, is only a form of sound, and it is therefore governed by just the same rules that govern the behaviour of sound in general. All sounds, the Eagle says, should be understood as disturbances in the air: as "eyre y-broken" (765). This includes speech (765–66), but the breaking of air can be effected "in many wise", so that the sounds made by pipes or harps, say, are very different (771–80). The movements of sound are analogous to the ripples on a body of water after a stone has been thrown into it (787–815). Just as ripples multiply in water, so too sound keeps on multiplying until, inevitably, it reaches the House of Fame (816–21). Since every thing is "enclyned" to move towards its proper place (its "kyndelych

stede", 823–42), and since the House of Fame is particularly capable of receiving sound (being "most conservatyf the soun", 843–47), then the inevitable conclusion is that "every speche of every man" moves "kyndely to Fames place" (848–52). In other words, the eventual arrival of all tidings at the House of Fame is not at all so "impossible" as the Chaucer's persona in the poem immediately assumes, but a necessary deduction from some of the most basic principles of medieval physics.

Admittedly, there is at least an amusing tension between the sheer earnestness and elaboration of this long discussion of the physical properties of sound, and the strangeness of the circumstances in which it is imagined to take place. If nothing else, it is at least ironic that the limits of what is physically "impossible" are discussed so thoroughly in the course of a conversation with an enormous talking bird. Indeed, one might have expected the poet to have been a little more willing to believe in the Eagle's account of the wonders of the House of Fame, given that the Eagle himself presents such an impressive contradiction of the ordinary rules of possibility. Certainly, Chaucer actually goes out of his way to emphasise the comedy of this encounter between the bird and his own persona within the poem.[2] When the Eagle first addresses 'Chaucer' it is only to complain about how uncomfortable he is to carry (573–74), which should presumably be taken as a joke at the expense of the poet's waistline. The narrator-figure himself is preoccupied with the concern that he might be on the point of being "stellifye[d]" (586): transformed into a star, that is, like so many figures in classical mythology (and in Ovid's *Metamorphoses* in particular). But this only suggests a rather exaggerated view of his own significance, as well as a

[2] A.J. Minnis describes the Eagle with provocative concision as "Chaucer's funny fowl" (*Oxford Guides to Chaucer: The Shorter Poems* (Oxford: Clarendon, 1995), 201).

degree of pusillanimity. Throughout his journey in the Eagle's claws, in fact, 'Chaucer' cuts an amusingly self-centred, testy figure – altogether more Arthur Dent than Dante[3] – and it is perhaps implicit that his terse rejection of the Eagle's description of the wonders of the House of Fame is not so much a serious challenge to his guide's scientific authority as a convenient way of giving vent to his irritation at finding himself in the undignified position of being in the Eagle's claws in the first place. Yet, despite the comedy implicit in the exchanges between the bird and its passenger, the description of the physics of sound to which they lead seems to be anything but frivolous. The Eagle's account of the movements of sound is painstakingly thorough and exact. There is nothing intrinsically comical about the substance of what he says, despite the ironies created by its context. Indeed, it could be argued that those ironies are only deepened by the fact that the Eagle's speech is so determinedly sober. By his own estimation at least, what he has to say about the physics of sound seems to amount to a rational and philosophically coherent account of the mechanisms of the natural world.

Perhaps the best way of explaining the odd combination of weightiness and whimsy that characterises the conversation between 'Chaucer' and the Eagle is to see the Eagle's whole speech as an exercise in pastiche: that is, as a deliberately and playfully imitative use of an identifiably distinct mode of discourse for comical, but not necessarily satirical, effect. However, seeing the Eagle's speech in this way only intensifies the question of what particular discourses, cultural traditions, or "authorities" he might be said to be imitating. After all, pastiche is generally most effective when its mimicry is most accurate and well-informed. If the Eagle is, in

3 For comparison of Chaucer's Eagle with Dante's, see Minnis, *Oxford Guides*, 202.

effect, pretending to be an expert in the physics of sound, what kind of expert exactly is he pretending to be? The Eagle himself suggests an answer to this question when he cites Aristotle, Plato and "other clerkys, many oon" (759–60). Aristotle is explicitly the first of the authorities cited by the bird, and even though it is emphasised that Aristotle's opinions were shared by Plato and many other philosophers, it is certainly true that nearly all of Eagle's ideas can be found in Aristotle's works. For example, the suggestion that "every thinge […]/ Hath his propre mansyon" (753–54) is apparently a version of Aristotle's analysis of "the locomotions of the elementary natural bodies – namely, fire, earth, and the like", in terms of a certain kind of "influence", whereby "each [element] is carried to its own place, if unhindered, the one up the other down".[4] Similarly, the observation that it is

[4] Aristotle, *Physics*, Book IV, cap. 4, 208[b] (according to the standard system of references to Bekker's 1831 edition of Aristotle's works), trans. R.P. Hardie and R.K. Gaye, in *The Complete Works of Aristotle: The Revised Oxford Translation*, ed. Jonathan Barnes, 2 vols (Princeton NJ, 1984: Princeton University Press; repr. 1995), 1:315–446, at 1:355; and for discussion of Aristotle's thinking on this point, see Edward Grant, *The Foundations of Modern Science in the Middle Ages: Their Religious, Institutional and Intellectual Contexts* (Cambridge: Cambridge University Press, 1996), 58–60. A version of this idea is also found in Plato's *Timaeus*, trans. Desmond Lee and Thomas Kjeller Johansen (London: Penguin, 2008): see e.g. 63d–e (according to the standard system of references to Stephanus's 1578 edition of Plato's works), trans. Lee and Johansen, 59: "the main aggregations of the basic kinds of matter occupy opposite regions to each other; and what is light or heavy or below or above in one region will be found to be or to become the direct opposite of, or to be at an angle to, or anyway different from, what has these characteristics in another region" (cf. also 56d–57c: trans. Lee and Johansen, 51–52).

natural for heavy things to fall and light things to rise, or, as Chaucer puts it, "Lyght thinge upwarde, and dounwarde charge" (746), seems to be at least a distant recollection of Aristotle's view that all bodies "have a natural tendency towards a certain position: and this is what it is to be light or heavy, the former being determined by an upward, the latter by a downward, tendency".[5] Meanwhile, the notion that sound is essentially broken air ("eyre y-broken"), so that the substance of sound is air itself ("in his substaunce ys but aire": 768), clearly resembles Aristotle's definition of sound specifically in terms of impact: "[air] must be struck with a

[5] Aristotle, *Physics*, Book VIII, cap. 4, 255b, trans. Hardie and Gaye, in Barnes, at 1:427. In Plato's *Timaeus*, 52e–53a (trans. Lee and Johansen, 44), this tendency is explained in terms of a comparison with the process of winnowing ("the things that were moved were constantly being separated and carried in different directions, rather like the contents of a winnowing basket or a similar implement for cleaning corn, in which the solid and heavy stuff is sifted out and settles on one side, the light and insubstantial on another […] It separated the kinds most unlike each other furthest away from each other and pushed those most like each other towards the same place, with the result that they came to occupy different regions of space even before they were arranged into an ordered universe"). In Calcidius's commentary, this winnowing is defined as the process by which "ea quae massa erunt secernuntur, grana quidem seorsum motu et agitatione, palaeae uero aliorsum ex iactatione; et leuia quidem uolitare, grauia uero residere" (*Timaeus, a Calcidio translatus commentarioque instructus*, ed. J.H. Waszink, in *Plato latinus* 4 (London: Warburg Institute, 1962), 344). In his study of the possible influence of Calcidius on Chaucer, Joseph E. Grennen picks out this last phrase ("leuia quidem uolitare, grauia uero residere"), and suggests that it is a "very apt translation of line 746" of the *House of Fame* ("Chaucer and Chalcidius: The Platonic Origins of the *House of Fame*," *Viator* 15 (1984): 237–62, at 247). However, unlike Calcidius, Chaucer's application of this phrase is not specifically to the idea of winnowing.

sudden sharp blow if it is to sound".[6] The Eagle's emphasis on the way in which sound produces movements of air ("And of thys movynge, out of doute,/ Another ayre anoon ys meved": 812–13) apparently corresponds with Aristotle's assertion that "What has the power of producing sound is what has the power of setting in movement a single mass of air which is continuous up to the point of hearing".[7] And even the Eagle's passing reference to the different kinds of sound produced by harps and pipes (771–79), and his comparison between them and human voices (780), have a precedent in Aristotle's careful distinction between the real, animate voice of a living creature and the metaphorical "voice" of a musical instrument.[8]

To a large extent, then, the authority to which the Eagle lays claim is clearly Aristotle's, and it is theoretically possible that Chaucer did have some direct knowledge of the relevant parts of Aristotle's corpus, via the commentaries of the twelfth-century Arabic philosopher Averroes (Ibn Rushd), Latin translations of which had been available in Europe since the first of half of the thirteenth century.[9]

6 Aristotle, *On the Soul*, Book II, cap. 8, 419^{b}, trans. J.A. Smith, in Barnes, 1:641–92, at 1:668. What Aristotle seems to have particularly in mind is the sound created by the snapping of a whip. Cf. Plato, *Timaeus*, 67, trans. Lee and Johansen, 63 ("Sound may be generally defined as a stroke given by air").

7 Aristotle, *On the Soul*, Book II, cap. 8, 420^{a}, trans. Smith, in Barnes 1:668.

8 Aristotle, *On the Soul*, Book II, cap. 8, 420^{b}, trans. Smith, in Barnes 1:669: "it [is] only by a metaphor that we speak of the voice of the flute or the lyre of generally of what (being without soul) possesses the power of producing a succession of notes which differ in length and pitch and timbre."

9 For a text of the Latin version of Averroes's "great" commentary on Aristotle's *De anima*, see F. Stuart Crawford, ed., *Averrois Cordubensis Commentarium Magnum in Aristotelis De Anima*

However, it has long been something of a consensus among Chaucerian scholars that the principal sources for the Eagle's acoustics are most likely to lie in the work of three eminent Latin authorities to whom Chaucer makes conspicuous reference elsewhere.[10] These are: first, the fifth-century philosopher Macrobius, who appears as a distinct figure within *The Parliament of Fowls* (lines 120–170) and whose commentary on Cicero's *Dream of Scipio* is mentioned on three other occasions in Chaucer's works;[11] second, the sixth-century philosopher Boethius, the author not just of the *Consolation of Philosophy*, but also, and more significantly in this context, a treatise on

(Cambridge MA: Medieval Academy of America, 1953). On the influence of Averroes's interpretations of Aristotle's physics, see Ruth Glasner, *Averroes' Physics: A Turning Point in Medieval Natural Philosophy* (Oxford: Oxford University Press, 2009). On the reception of Aristotle in the Latin West more generally, see Bernard G. Dod, "Aristoteles latinus," in *The Cambridge History of Later Medieval Philosophy*, ed. Norman Kretzmann et al. (Cambridge: Cambridge University Press, 1982; repr. 1996) [henceforth *CHLMP*], 45–79; C.H. Lohr, 'The Medieval Interpretation of Aristotle', *CHLMP*, 80–98. A set of useful resources in relation to Averroes can be found at the Digital Averroes Research Environment (http://dare.uni-koeln.de [accessed 23rd January, 2017]).

10 See, for example, Minnis, *Oxford Guides*, 203. This consensus seems to have been established at least since Wilbur Owen Sypherd's *Studies in Chaucer's Hous of Fame*, Chaucer Society 2nd Series, Vol. 39 (London: Kegan Paul, 1904), where the three authors' influence on the *House of Fame* is tabulated at 97–100.

11 Macrobius, *Commentarii in somnium Scipionis*, ed. James A. Willis (Leipzig: Teubner, 1970), trans. William Harris Stahl as *Commentary on the Dream of Scipio by Macrobius* (New York: Columbia University Press, 1952; repr. 1990). Chaucer refers to Macrobius in *The Book of the Duchess*, line 284; the Nun's Priest's Tale, VII.3123; *The Romaunt of the Rose*, Fragment A, line 7.

music, to which Chaucer clearly alludes in the Nun's Priest's Tale (VII.3293–94);[12] and third, the thirteenth-century encyclopedist, Vincent of Beauvais, whom Chaucer names directly in the G-prologue to the *Legend of Good Women* (line 307).[13] Nearly all of the "Aristotelian" motifs that I have listed can also be found in the work of these three men.[14] Boethius and Vincent of Beauvais also provide analogues for the one

[12] Boethius, *The Consolation of Philosophy*, ed./trans. S.J. Tester, in *Boethius: The Theological Tractates: The Consolation of Philosophy*, ed. H.F. Stewart, E.K. Rand and S.J. Tester (Cambridge MA: Harvard University Press, 1918; repr. 1990); Boethius, *De institutione musica*, ed. Gottfried Friedlein, in *Anicii Manlii Torquati Severini Boetii De institutione arithmetica libri duo, De institutione musica libri quinque*… (Leipzig: Teubner, 1867), trans. C.M. Bower as *Fundamentals of Music* (New Haven NJ: Yale University Press, 1989).

[13] Vincent of Beauvais, *Speculum quadruplex*, vol. 1: *Speculum naturale* (Strasbourg: Rusch, *ante* 1476). For a general set of resources in relation to Vincent, see *A Vincent of Beauvais Website* (http://www.vincentiusbelvacensis.eu/index.html [accessed: 23rd January, 2017].

[14] For example, Aristotle's view that "each [element] is carried to its own place, if unhindered, the one up the other down" is reflected by Macrobius, *Commentary*, Book 1, cap. 22, trans. Stahl, 181–182; and Boethius, *Consolation*, Book III, prose 11, ed./trans. Tester, 290–93. However, this idea was so widely known in the Middle Ages as to be something of a commonplace: it also appears for example, in St. Augustine, *Concerning the City of God against the Pagans*, Book 11, cap. 28, trans. Henry Bettenson (London: Penguin, 1984), 463; Bernard Silvestris, *Cosmographia*, trans. Winthrop Wetherbee (New York: Columbia University Press, 1973; repr. 1990), 72; and William of Conches, *Dragmaticon Philosophie*, Book 2, cap. 6, trans. Italo Ronca and Matthew Curr as *A Dialogue on Natural Philosophy* (Notre Dame: University of Notre Dame Press, 1997), 33–34. Sound is defined in terms of impact or percussion in Macrobius, Book II, cap. 1, trans. Stahl, 185–86; Boethius, *De institutione*, Book I, cap. 3, ed. Friedlein, 189 ("Idcirco definitur sonus percussio aëris indissoluta usque ad auditum"), trans.

distinctive feature of the Eagle's speech for which no clear precedent or inspiration is readily available in Aristotle, and which effectively provides the centre-piece of the Eagle's whole argument: that is, the proof "by experience" (788) of throwing a stone

Bower, 11 ("Sound is defined as a percussion of air remaining undissolved all the way to the hearing"); and Vincent, *Speculum*, Book 5, cap. 14 ("Sonus est aeris percussio indissoluta usque ad auditum"). Again parallels for this idea seem to have been widely disseminated, particularly in the context of medieval grammar (see Martin Irvine, "Medieval Grammatical Theory and Chaucer's *House of Fame*," *Speculum* 60 (1985): 850–76): for example, Donatus's definition of voice as "aer ictus sensibilis auditu" (Irvine, 854). Cf. also the allegorical description of the senses by Chaucer's near-contemporary Heinrich von Mügeln, who describes Hearing as one of the horses pulling the chariot of Reason: "sin futer was der lüfte slak,/ das pfert nicht ander weide pflak" ("Its food was the striking of the air. The horse did not graze in any other way"), ed./trans. Annette Volfing, *Heinrich von Mügeln: 'Der meide kranz': A Commentary* (Tübingen: Niemeyer, 1997), lines 1141–42, at 211. In relation to the "movynge [of] ayre", cf. Boethius, *De institutione*, Book I, cap. 3, ed. Friedlein, 189 ("pulsus vero atque percussio nullo modo esse potest, nisi praecesserit motus"), trans. Bower, 11 ("pulsation and percussion cannot exist by any means unless motion precedes them"); Vincent, *Speculum*, Book 5, cap. 14 ("Sonatum autem est motivum aeris"). For the distinction between wind and stringed instruments, see Boethius, *De institutione*, I. 2, ed. Friedlein, 189, trans. Bower, 10; and Macrobius, Book II, cap. 4, trans. Stahl, 197–98. See also J.A.W. Bennett's discussion of the sources of the Eagle's speech in *Chaucer's Book of Fame: an Exposition of 'The House of Fame'* (Oxford: Clarendon, 1968), pp. 76–80: he foregrounds Dante and Macrobius, and also suggests parallels with Vitruvius and Adelard of Bath, among others. More recently, Rebecca Davis's discussion of the Eagle's sources focuses on Dante and Boethius ("Fugitive Poetics in Chaucer's *House of Fame*," *Studies in the Age of Chaucer* 37 (2015): 106–111.

into a body of water and watching the ripples spread.[15] Either one of these writers could be Chaucer's immediate source for this conceit: the parallels are, in each case,

[15] Boethius, *De institutione*, Book 1, cap. 14, ed. Friedlein, 200: "Tale enim quiddam fieri consuevit in vocibus, quale cum in paludibus vel quietis aquis iactum eminus mergitur saxum. Prius enim in parvissimum orbem undam colligit, deinde maioribus orbibus undarum globos spargit, atque eo usque dum defatigus motus ab eliciendis fluctibus conquiescat. Semperque posterior et maior undula pulsu debiliore diffunditur. Quod si quid sit, quod crescentes undas possit offendere, statim motus ille revertitur et quasi ad centrum, unde profectus fuerat, eisdem undulis rotundatur. Ita igitur cum aër pulsus fecerit sonum, pellit alium proximum et quodammodo rotundum fluctum aeris ciet, itaque diffunditur et omnium circum stantium simul ferit auditum" (trans. Bower, 21: "The same thing happens in sounds that happens when a stone, thrown from above, falls into a puddle or into quiet water. First it causes a wave in a very small circle; then it disperses clusters of waves into larger circles, and so on until the motion, exhausted by the spreading out of waves, dies away. The latter, wider wave is always diffused by a weaker impulse. Now if something should impede the spreading waves, the same motion rebounds immediately, and it makes new circles by the same undulations as at the center whence it originated. In the same way, then, when air that is struck creates sound, it affects other air nearby and in this way sets in motion a circular wave of air; and so it is diffused and reaches the hearing of all standing around at the same time"); Vincent of Beauvais, *Speculum*, Book 5, cap. 17: "sonus efficitur secundum circulum maiorem et minorem; itaque minor circulus generat maiorem: et ille iterum maiorem. Cuius exemplum patet in lapillo in aqua proiecto in aquam, videlicet stantem. Ubi videlicet lapis cadens est centorum multorum circulorum successive generatorum [*read:* generator], eo quod una pars aque impulsata inundat super aliam circumquaque per circumferentiam." Cf. also Vincent, *Speculum*, Book 26, cap. 58: "Ad quod demonstrandum [i.e. how sounds are made] inducit idem Boecius tale exemplum: lapis proiectus in medio stagni facit breuissimum circulum, et

very strong, and there is no doubt that Chaucer might have known either or both of them directly. So it looks like the case is already closed: the scientific tradition to which the Eagle lays claims is largely Aristotelian, and Chaucer could easily have sourced his Aristotelianism from the three venerable and widely cited authorities whose work he claims himself to have known: that is, Macrobius, Boethius and Vincent of Beauvais.

II. THE 'CUTTING-EDGE' EAGLE?

The one thing that is troubling about this analysis is that it makes the Eagle's scientific horizons (and by extension, Chaucer's) seem so very old-fashioned. The

ille alium, et hoc fit donec vel ad ripas pervenerit, vel impetus defecerit." In Calcidius's commentary on the *Timaeus*, this image is used to describe not sound, but the nature of primary matter: "Sed ut in stagnis, cum immobilis est aquae superficies, incidente aliqua grauiore mole primo nascitur initium motus, deinde agitatione facta totius elementi non solum agmen aquae mouetur, sed illud ipsum, quod incidit causamque motus praebuit, uicissim mouet, sic silua quoque ex initio corporum sumpto motu non solum ipsa omnifariam mouetur, uerum ipsa corpora, quae initium motus sunt, inuicem pellit" (ed. Waszink, 343; see also Grennen, "Chaucer and Chalcidius," 255–56). The same analogy is also used by Averroes (*Commentarium Magnum*, 419b, ed. Crawford, 248: "Et debes scire quod sonus non fit in aere ita quod aer qui expellitur a percutiente movetur per se singulariter donec perveniat ad auditum, sed debes scire quod illud quod fit in aere de percussione corporum adinvicem est simile ei quod fit in aqua, quando lapis proiicitur in aquam, scilicet quia fit in aere apud percussionem figura sperica, aut prope spericam, cuius centrum est locus percussionis per expulsionem aeris ab illo loco equaliter, aut prope." (Both of the references to the *Speculum naturale* in the *Riverside Chaucer* – "4.18 and 25.58" – are erroneous.)

implication is that Chaucer had no acquaintanceship with the remarkable scientific developments that had taken place in England since the middle of the thirteenth century, very often as a direct response to Aristotle's physics. This was a period that saw England (and Oxford in particular) develop a remarkable reputation for highly rigorous, innovative and precise thinking about the workings of the universe. The possibility that Chaucer's thinking about the physics of sound might actually be more up-to-date than it might at first seem has been advocated most energetically by Joseph E. Grennen.[16] He defines the Eagle's speech as "a pastiche of terms and ideas drawn from contemporary scientific writing"; and he suggests, among other things, that the Eagle's speech reflects the particular influence of Robert Grosseteste and Walter Burley. These claims are perhaps worth exploring more fully, in part because they imply that Chaucer's engagement with scientific thought was much deeper and more active than is usually assumed, and in part because they rely on correspondences of terminology and argument that are not easy to assess or interpret.

Grosseteste was not exactly a "contemporary" of Chaucer (he died in 1253), but he was a highly original thinker, in many ways at the cutting edge of scientific thinking in the thirteenth century, and he has at least a good claim to being the founding father of the English scientific tradition that I have just described.[17]

[16] Joseph E. Grennen, "Science and Poetry in Chaucer's *House of Fame*," *Annuale Mediaevale* 8 (1967): 38–45.

[17] On Grosseteste's science, and his mind in general, see A.C. Crombie, *Robert Grosseteste and the Origins of Experimental Science 1100–1700* (Oxford: Clarendon, 1953); R.W. Southern, *Robert Grosseteste: The Growth of an English Mind in Medieval Europe* (1986; 2nd edn: Oxford: Clarendon,

Grosseteste wrote a set of Notes on Aristotle's *Physics*, which seem to have been widely cited in Oxford well into the fourteenth century,[18] as well as a whole series of short, and in some cases brilliantly innovative, works on specific questions in physics, including one on the generation of sounds.[19] As lector to the Franciscans in Oxford and then Bishop of Lincoln, Grosseteste exerted a powerful influence on the intellectual development of the university. A.C. Crombie even claims that "Grosseteste's theory of science determined the approach of the next generations of Oxford natural philosophers to the physical world" and that "their work was in many ways simply an elaboration in concrete detail of his general principles of investigation and explanation."[20] This formulation possibly overstates the case, but there is no question that Grosseteste is a very important figure in the history of English

1992); James McEvoy, *Robert Grosseteste* (Oxford: Oxford University Press, 2000); Maura O'Carroll, ed., *Robert Grosseteste and the Beginnings of a British Theological Tradition* (Rome: Istituto Storico dei Cappuccini, 2003); Evelyn A. Mackie and Joseph Goering, eds, *Editing Robert Grosseteste* (Toronto: University of Toronto Press, 2003).

18 Richard C. Dales, ed., *Roberti Grosseteste Commentarius in VIII Libros Physicorum Aristotelis* (Boulder: University of Colorado Press, 1963). See also Neil Lewis, "Robert Grosseteste's *Notes on Physics*," in *Editing Robert Grosseteste*, ed. Mackie and Goering, 103–34.

19 Ludwig Baur, ed., *Die Philosophie des Robert Grosseteste Bischofs von Lincoln († 1253)* (Münster: Aschendorff, 1917); Cecilia Panti, ed., *Moti, virtù e motori celesti nella cosmologia di Roberto Grossatesta: Studio ed edizione dei trattati De sphera, De cometis, De motu supercelestium* (Florence: SISMEL/Galluzzo, 2001). *De generatione sonorum,* ed. Baur, 7–10 (available online at the *Electronic Grosseteste*, http://www.grosseteste.com [accessed: 17th May 2016]).

20 Crombie, *Robert Grosseteste*, 135.

science, and certainly important enough for Grennen's suggestion of a connection between Grosseteste and Chaucer to invite further scrutiny.

As it turns out, Grennen's evidence for Chaucer's direct knowledge of Grosseteste's writing is not very convincing. He argues that "the eagle's definition of sound in terms as 'noght but eyr ybroken' [(765)] is probably Chaucer's deliberately garbled version of a current explanation not of sound *simpliciter* but of the echo – a reversal of sound caused by a *fractio radii* at the obstacle with which it collides, on the analogy with the reflection of light".[21] This seems like an unnecessarily complex explanation of what the Eagle actually says, given that the idea of sound as "broken air" was relatively commonplace in the Middle Ages, and readily available to Chaucer in the work of Boethius, Macrobius and Vincent of Beauvais (and probably elsewhere as well). Grennen also suggests that *The House of Fame*'s reference to the air being "twyst with violence" (775) should be compared with a specific sentence from Grosseteste's Commentary on Aristotle's *Posterior Analytics*, in which "the substance of sound" is defined as "light incorporated into the very finest air, [so that] when a sounding object is violently struck, parts of it are necessarily scattered from the natural position that they occupy throughout the sounding body".[22] Grosseteste's Commentary on the *Posterior Analytics* seems to have become a relatively well known text in medieval universities, but there is no particular reason for thinking that

[21] Grennen, "Science and Poetry," 42.

[22] Robert Grosseteste, Commentary on Aristotle's *Posterior Analytics*, II. 4: "Substantia autem soni est lux incorporata in subtilissimo aere, et cum percutitur sonativum violenter necesse est partes eius disgredi a situ suo naturali quem habent in toto sonativo" (cited from Crombie, *Robert Grosseteste*, 115, n. 1).

Chaucer would have made direct use of it himself; and the sentence to which Grennen points actually has little in common with the *House of Fame* except for its shared heritage in Aristotle. That both the Eagle and Grosseteste refer to "violence" in the context of sound is not very telling in itself, since the violence in question is specifically that of impact, and the emphasis on impact goes back to Aristotle (the "sudden sharp blow" from which sound is created). There is certainly no parallel in the Eagle's speech for what is the most distinctive aspect of Grosseteste's acoustics: the suggestion that the substance of sound is ultimately light – "light incorporated into the very finest air".[23] There are several problems, finally, with Grennen's insistence that the Eagle's reference to both a "demonstracion/ In myn ymagynacion" (727–28) and a proof "by experience" (787–88) reflects "the fourteenth-century physicist's distinction between problems conceived *secundum imaginationem* ('thought experiments') and those worked out *per experimentiam*". This he suggests (following Crombie) was Grosseteste's peculiar "contribution" to the history of European science.[24] Here he makes too casual a conflation between the language of fourteenth-century scientific writing and the particular terms of Grosseteste's own thinking, as if it would have been impossible to draw any distinction between imagination and experience in the fourteenth century without specific deference to what Crombie sees as Grosseteste's uniting of "the two twelfth-

[23] The Eagle argues at one point that sound is in "aire y-broke" in the same way as flames are "lyghted smoke" (769–770), but this is an analogy designed to explain only how sound is incorporated in air (just as flame is a kind of special form of smoke), not a suggestion to the effect that light provides any part of sound's substance.

[24] Grennen, "Science and Poetry," 42.

century traditions of technology and logic". Grennen also insists too narrowly on the connection between these two moments in the Eagle's speech – that is, the "demonstracion/ In myn ymagynacion" and the proof "by experience" – as if they were necessarily to be read as opposing terms in a single contrast, even though they are actually separated by some sixty lines.

Grennen goes on to argue that "the most convincing proof […] of Chaucer's familiarity with current speculation [in scientific thought]" is his apparent familiarity with Walter Burley's Commentary on Aristotle's *Physics.*[25] Again, this would be a very significant connection – if it could be proved. Like Grosseteste, Burley is a very significant figure in the history of natural philosophy. He was a regular antagonist of William Ockham (who, like Burley, wrote on Aristotle's *Physics*);[26] and among the various issues on which Burley and Ockham disagreed was the way in which the

[25] In fact, Burley seems to have engaged so continuously with Aristotle's *Physics* as to have produced several distinct versions of his commentary: see Rega Wood, "Walter Burley's *Physics* Commentaries," *Franciscan Studies* 44 (1984): 275–327. On Burley's career more generally, see Edith D. Sylla, *The Oxford Calculators and the Mathematics of Motion 1320–1350: Physics and Measurements of Latitudes* (New York, 1991; originally a Harvard doctoral dissertation, 1970), 70–111; Jennifer Ottman and Wood, "Walter Burley: His Life and Works", *Vivarium* 37 (1999): 1–23; M.C. Sommers, "Burley, Walter (b. 1274/5, d. in or after 1344)," *Oxford Dictionary of National Biography* [henceforth *ODNB*], article 4037.

[26] On Ockham generally, see Paul Vincent Spade, ed., *The Cambridge Companion to Ockham* (Cambridge: Cambridge University Press, 1999); and on Ockham's physics, in particular, André Goddu, "Ockham's Philosophy of Nature," *Cambridge Companion*, 143–67.

quantity of motion inheres in any moving body.[27] It is perhaps worth emphasizing that Burley, like many thirteenth- and fourteenth-century English physicists, tended to subordinate questions on natural science to both theology and formal logic, in such a way as to make much of the "scientific thinking" in this period a dizzying mixture of the vastly philosophical and the narrowly terminological.[28] However, Burley's interest in physical questions, and in questions of motion in particular, is pronounced enough to mean that he is also sometimes seen as precursor to that group of extraordinarily brilliant English thinkers now known interchangeably as the Mertonians or the Oxford Calculators, whose particular contribution was the introduction, to this already heady mix of methodologies, of a large dose of mathematics. Burley is sometimes classed as a full member of this group, as he is, for example, by Edith Sylla, the author of what is still the most thorough and accessible study of the Calculators and their work,[29] even though much of Burley's own

[27] J.A. Weisheipl, "The Interpretation of Aristotle's Physics and the Science of Motion," in *CHLMP*, 521–36, esp. 530–32; see also Edith Dudley Sylla, "Walter Burley's *Physics* Commentaries and the Mathematics of Alteration," *Early Science and Medicine* 6 (2001): 149–184; Dirk-Jan Dekker, "Time and Motion in Walter Burley's Late *Expositio* on Aristotle's *Physics*," *Early Science and Medicine* 6 (2001): 185–203.

[28] For a concise and suggestive analysis of fourteenth-century intellectual culture generally, see John E. Murdoch, "The Development of a Critical Temper: New Approaches and Modes of Analysis in Fourteenth-Century Philosophy, Science and Theology," in *Medieval and Renaissance Studies: Proceedings of the Southeastern Institute of Medieval and Renaissance Studies: Summer 1975*, ed. Siegfried Wenzel (Chapel Hill: University of North Carolina Press, 1978), 51–79.

[29] Sylla, *Oxford Calculators* (cited above, n. 25). See also Marshall Clagett, *The Science of Mechanics in the Middle Ages* (Madison WI: University of Wisconsin Press, 1959); Curtis Wilson, *William*

philosophical activity in this field predates what is probably the defining text in this intellectual movement, Thomas Bradwardine's treatise of 1328, *De proportionibus velocitatum in motibus*.[30] In this treatise, Bradwardine set out to remedy one of the most

Heytesbury: Medieval Logic and the Rise of Mathematical Physics (Madison WI: University of Wisconsin Press, 1956); J.A. Weisheipl, "The Place of John Dumbleton in the Merton School," *Isis* 50 (1959): 439–54; J.A. Weisheipl, "Ockham and Some Mertonians," *Mediæval Studies* 30 (1968): 163-213; J.A. Weisheipl, "Repertorium Mertonense," *Mediæval Studies* 31 (1969): 174–224; E.D. Sylla, *The Oxford Calculators and the Mathematics of Motion, 1320–1350: Physics and the Measurement by Latitudes* (doctoral dissertation, Harvard, 1970; repr. New York, 1991); Crombie, 1:86–93 and 2:57–110; North, 16–17; E.D. Sylla, "The Oxford Calculators," *CHLMP*, 540–63; William J. Courtenay, *Schools and Scholars in Fourteenth-Century England* (Princeton NJ: Princeton University Press, 1987), esp. the section on "The New Physics," 240–49; David C. Lindberg, *The Beginnings of Western Science: The European Scientific Tradition in Philosophical, Religious and Institutional Context, Prehistory to A.D. 1450* (Chicago: University of Chicago Press, 1992; repr. 2007), 300–306; Keith Snedegar, "Merton Calculators (act. c.1300–c.1349)," *ODNB*, theme 95034.

30 H. Lamar Crosby, *Thomas of Bradwardine: his Tractatus de proportionibus: its significance for the development of mathematical physics* (Madison WI: University of Wisconsin Press, 1955); Weisheipl, "The Interpretation of Aristotle's Physics" (cited above n. 27), esp. 533–36; John E. Murdoch, "Thomas Bradwardine: Mathematics and Continuity in the Fourteenth century," in *Mathematics and its Applications to Science and Natural Philosophy in the Middle Ages: Essays in Honor of Marshall Clagett*, ed. Edward Grant and John E. Murdoch (Cambridge: Cambridge University Press, 1987), 103–37. For Bradwardine's logic, see *Thomas Bradwardine: Insolubilia*, ed. Stephen Read (Paris: Peeters, 2010). For his life, see Gordon Leff, "Bradwardine, Thomas (c.1300–1349)," *ODNB*, article 3213. Weisheipl sees Bradwardine as the "founder of the Merton School" ("Ockham and Some Mertonians," 189).

obvious defects in Aristotle's *Physics*, the lack of mathematical explanation of the principles governing acceleration and velocity, and it was this work (rather than Grosseteste's suite of short, speculative treatises on particular questions in physics) that seems to have set the dominant agenda for what was to develop into an extensive and distinctly Oxford-based tradition of work on the inter-relationship between logic, physics and mathematics, with a particular focus on problems in mechanics (i.e. on problems relating to forces and motions). This tradition includes work by such figures as William Heytesbury, John Dumbleton, Richard Kilvington, Richard Swineshead and Roger Swineshead. Their achievements have been described as "a revolution in scientific thought",[31] not just because of their treatment of the particular mechanical problems they chose to solve, but also because of the precedent they set for the use of mathematics in natural science.[32] In popular histories of science,[33] the Oxford Calculators are now sometimes given particular

[31] Weisheipl, "The Place of John Dumbleton," 439.

[32] Lindberg rightly comments that while "today the application of mathematics to motion needs no defense […] it is only by hindsight and from a modern perspective that this conclusion is obvious; it would not have seemed plausible to many who worked within the Aristotelian tradition" (*Beginnings*, 299).

[33] See, e.g., James Hannam, *God's Philosophers: How the Medieval World Laid the Foundations of Modern Science* (London: Icon, 2009), 175 ("they [the Mertonians] almost certainly beat out the path later followed by Galileo and the other founders of modern science") and 178–180 (where the mean speed theorem is described as "the most significant result of fourteenth-century physics"). However, as Lindberg observes, "medieval physics was not a primitive version of modern physics and cannot be legitimately judged by comparison with it modern namesake" (*Beginnings*, 286)

credit for having anticipated Galileo in the formulation of the mean speed theorem (which describes the distance covered in a specified time by a uniformly accelerated or decelerated body);[34] but perhaps what is most striking is that, for them, the mean speed theorem was, as Sylla puts it, merely "a fairly routine lemma":[35] that is, only a relatively basic premise preliminary to addressing problems that were in themselves much more complex. The existence of this tradition in Oxford certainly demonstrates that scientific thinking in the fourteenth century extended well beyond the astrology, alchemy and magic that student-guides to Chaucer tend to represent as the sum-total of medieval science,[36] but also quite a long way beyond the relatively

[34] In Heytesbury's formulation: "For whether it [i.e. latitude or increment of velocity] commences from zero degree or from some [finite] degree, every latitude, as long as it is terminated at some finite degree, and as long as it acquired or lost uniformly, will correspond to its mean degree of velocity. Thus the moving body, acquiring or losing this latitude uniformly during some assigned period of time, will traverse a distance exactly equal to what it would traverse in an equal period of time if it were moved uniformly at its mean degree [of velocity]" (Heytesbury, *Reguli solvendi sophismata* (Venice: Locatellus, 1494), trans. Clagett, *Science of Mechanics*, 270). See also Edward Grant, *Physical Science in the Middle Ages* (New York: Wiley, 1971), 55–59; Grant, *Foundations of Modern Science*, 100–104.

[35] Sylla, *Oxford Calculators*, 174: "Aside from the fact that Swineshead gives four different proofs of the mean speed theorem, it would appear to be a fairly routine lemma. He does not give it any special importance, and does not even give it the honor of labelling it as a separate conclusion."

[36] See e.g. Mahmoud Manzalaoui, "Chaucer and Science," in *Geoffrey Chaucer: The Writer and his Background*, ed. Derek Brewer (Cambridge: Brewer, 1974; repr. 1990), 224–61; Irma Taavitsainen, "Science," in *A Companion to Chaucer*, ed. Peter Brown (Oxford: Blackwell, 2000;

simple models and basic observations about the structure of things that characterize the Eagle's speech in the *House of Fame*.

It certainly seems hard to believe that Chaucer knew absolutely nothing at all about the Calculators' work in physics, not even by reputation. After all, Thomas Bradwardine (the author of *De proportionibus*) is mentioned very prominently in the Nun's Priest's Tale (VII.3242); and it may well be that the Nun's Priest's Tale refers to him a second time (this time more codedly) in the plea for a benediction with which this Tale concludes.[37] At the end of *Troilus and Criseyde* Chaucer submits the poem to the scrutiny of his learned friend, Ralph Strode, who is probably to be identified with the logician who was a fellow of Merton College, like so many of the Calculators earlier in the century (including Walter Burley).[38] However, there is no indication that Strode himself had any particular interest in the kind of mechanical problems so characteristic of his predecessors at Merton; and the Nun's Priest

repr. 2002), 378–96; J.A. Tasioulas, "Science," in *Chaucer: An Oxford Guide*, ed. Steve Ellis (Oxford: Oxford University Press, 2005), 174–89. Not one of these accounts of Chaucer's scientific horizons even mentions fourteenth-century English physics.

37 See David P. Baker, "A Bradwardinian Benediction: The Ending of the Nun's Priest's Tale Revisited," *Medium Ævum* 82 (2013): 236–43; David P. Baker, "Literature, Logic and Mathematics in the Fourteenth Century," unpublished doctoral dissertation (University of Durham, 2013), 104–107.

38 See Rodney Delasanta, "Chaucer and Strode," *Chaucer Review* 26 (1991): 205–18; J.D. North, "Strode, Ralph (*d.* 1387)," *ODNB*, article 26673. On Strode's logic, see Wallace Knight Seaton, "An Edition and Translation of the 'Tractatus de Consequentiis' by Ralph Strode, Fourteenth-Century Logician and Friend of Geoffrey Chaucer," unpublished doctoral dissertation (University of California, Berkeley, 1973).

invokes Bradwardine, not as the author of *De proportionibus*, but only as the author of the monumental philosophical treatise, *De causa Dei*:[39] in other words, as a controversial theologian, rather than as a pioneer in the mathematization of physics. If it could be proved that Chaucer was directly acquainted with Burley's work on Aristotle's *Physics*, then it would be hard to deny that Chaucer would have been capable of appreciating this whole tradition of advanced scientific speculation.

Once again, however, Grennen's evidence for Chaucer's "Chaucer's familiarity with current speculation [in scientific thought]" turns out to be disappointingly thin; and the case he makes for Chaucer's knowledge of Burley's commentary on Aristotle's *Physics*, is not, in itself, at all convincing. What Grennen argues, specifically, is that Chaucer's use of the word "conservatyf" (847) in the course of saying that the House of Fame is the place in the universe that best "conserves" sound was directly conditioned by Burley's use of the expression "virtutem conseruatiuam locati existentis" in the course of explicating Averroes's reading of Aristotle's fourth book of *Physics*. This phrase Grennen translates as "a power for conserving the placed thing". However, the passage in Burley's commentary from which Grennen cites this phrase is not nearly so relevant to the Eagle's concept of "kyndely place" (842) as Grennen suggests it is, since what it is specifically at issue for Burley is how the "natural place" of each elements ought to be defined in relation

[39] Thomas Bradwardine, *De causa Dei contra Pelagium et de virtute causarum* (London: John Bill, 1618). There is no modern edition of this work: however, edited extracts with translations into modern German have recently been published by Edit Anna Lukács, in *Thomas Bradwardine: De causa Dei contra Pelagium et de virtute causarum: Auszüge Lateinisch-Deutsch* (Göttingen: V&R Unipress, 2013).

to the other elements, particularly in the light of Aristotle's proposition that "the place of a thing is the innermost motionless boundary of what contains it".[40] Burley is principally concerned here with Averroes's rejection of what might look like an obvious deduction from Aristotle's proposition: i.e. that if "the place of a thing is the innermost motionless boundary of what contains it", then the "natural place" of earth is therefore the "innermost motionless boundary" of the element which is naturally adjacent to it. But this deduction would be obviously wrong in a number of ways, as Averroes and Burley emphasize:

> Certum est quod terra non moueretur ad superficiem aque ibi existentem, et propter hoc superficies aque non est locus naturalis per se ipsius terre, et hec est intentio Commentatoris commento .24. [*recte* .42.] huius capituli, ubi dicit quod "graue querit hunc finem [nisi] secundum quod est medium totius, et non secundum quod est finis aque. Et si non esset ita, tunc terra moveretur ad aquam ubicunque fuerit finis eius, sicut ferrum mouetur ad magnetem ubicunque fuerit. Sed hoc non sentit[ur] de aqua"[41] – hec Commentator. Dico igitur quod ultimum aque non est per se locus naturalis terre, nec eadem ratione est ultimum aeris locus naturalis aque.
>
> Certainly, earth is not attracted only so far as the surface of any water happening to be there, and therefore the surface of the water is not the "natural place" of earth in and of itself: this what the Commentator means to

[40] Aristotle, *Physics*, Book IV, cap. 4, $212^{b}20$, trans. Hardie and Gaye, in Barnes, at 1:361.

[41] Averroes, Commentary on Aristotle's *Physics*, 42 (Venice: Andreas Torresanus, 1483), fol. 54ra; (Venice: Lucas Antonius Iuncta, 1562), fol. 140va–vb.

> say in his 24th [*recte* 42nd] comment on this chapter, where he says that "a heavy thing seeks this boundary [between earth and water], not just to the extent that it seeks to reach the boundary of the water, but rather to the extent that it seeks to reach the middle of the whole. And if this were not the case, then earth would always be attracted to [the surface of] the water wherever it happened to be, just as iron is attracted to a magnet where it happens to be, but this is found not to be the case with water" – such [are the words of] the Commentator. I say, therefore, that the surface of water is not in itself the "natural place" of earth, nor by the same reason is the boundary with air the "natural place" of water.[42]

In effect, what Averroes and Burley argue is that, even if earth is always attracted downwards such that it always passes through water until it reaches at least the boundary between earth and water, this does not mean that it is solely and particularly to this boundary that earth is attracted.

It is only in the course of trying to explicate this very technical point that Burley introduces what is, in effect, a distinction between two different ways of conceiving of the elements' attraction to their "natural place". It is not just that each element is drawn away from the other elements in such a way that it is always trying to reach at least the limits of the space occupied by any of the others. His point is that it is also drawn to its own proper sphere, in such a way that this elemental attraction always

[42] Walter Burley, Commentary on Aristotle's *Physics* (Venice: Johannes Herbort, 1482), fol. 117v; (Venice: Simon de Luere, 1501; facsimile repr. Hildesheim: Olms, 1972), fol. 106ra.

operates, regardless of the nature of each element's boundaries with the other elements:

> Et si queratur quis igitur est locus naturalis terre per se, loquendo de loco locante et circumscribente, dico quod locus naturalis per se ipsius terre est ultimum aque secundum quod aqua est in tali situ, et in tali distantia ad orbem. Locus enim naturalis plus dic[o] [43] quam ultimum corporis continentis, quia ultra ultimum corporis continentis, addit virtutem conseruatiuam locati existentis in corpore locante; et ideo si aer esset in loco totius aque, ultimum aeris esset locus naturalis terre, quia aer existens in tali situ, haberet virtutem conseruandi terram.
>
> And if it were asked what therefore is the "natural place" of earth in itself, I would say that the "natural place" in which earth is located and circumscribed, in and of itself, is the boundary with water [only] to the extent that water is in that particular position and at some distance from the sphere [of earth itself]. I refer to "natural place"[44] rather than the boundary of a containing body [i.e. to the nature of attractive forces, rather than to Aristotle's conceptualisation of extension in space], since beyond the boundary of the containing body, this additionally confers the conserving power of an existing location (*virtutem conseruatiuam locati existentis*). This means that, if the place of the water were wholly taken by air, the "natural place" of

[43] dico] dicit (in both the 1482 and 1501 editions)

[44] Grennen translates: "non-natural place". He seems to have mis-expanded the abbreviation for "enim", wrongly reading "non".

> earth would then be the boundary of air, since air existing in that particular place would have the power to keep earth in position.

It looks as if Burley might have been particularly indebted here to St Thomas Aquinas's Commentary on Aristotle's *Physics*:

> Videmus enim quod unumquodque horum fertur in suum proprium locum quando non impeditur, grave quidem deorsum, leve autem sursum. Ex quo patet quod locus habet quandam virtutem conservandi locatum: et propter hoc locatum tendit in suum locum desiderio suae conservationis. Non autem ex hoc ostenditur quod locus habeat virtutem attractivam, nisi sicut finis dicitur attrahere.
>
> For we observe that each of these bodies is carried to its proper place when it is not prevented, i.e., the heavy are carried down and the light upward. This shows that place has a certain power of conserving what is in place. For this reason, an object tends to its own place by the desire to conserve itself. This, however, does not prove that place has the power to attract, except in the sense in which the end is said to attract.[45]

Aquinas's *virtus conservandi locatum* ("power of conserving what is placed") is simpler and more immediately comprehensible than Burley's *virtus conservativa locati existentis* ("conserving power of an existing location"), and it may well be that Burley's phrasing here should be interpreted merely as a version of Aquinas's formulation.

[45] St Thomas Aquinas's Commentary on Aristotle's *Physics*, Book IV, Lectio 1, 412, ed./trans. Pierre H. Conway (College of St Mary of the Springs: Columbus OH, 1958–62), online at: http://dhspriory.org/thomas/Physics.htm) [accessed: 17th May, 2016].

Whether or not this is the case, it is clearly part of a relatively involved philosophical discussion, and the point it is designed to make is very specific to this discussion. It is difficult to see how Chaucer's Eagle's suggestion that the House of Fame naturally conserves sound must necessarily reflect any of these complexities. There is simply no reason to think that this particular phrase would have captured Chaucer's attention, even if he had been reading Burley attentively and with profit.

III. RIPPLES ON THE WATER

So far, then, my argument has been rather negative and inconclusive: I have simply observed that thirteenth- and fourteenth-century English physics seems to be conspicuous only by its absence from the Eagle's account of the mechanics of sound; and I have contested Grennen's suggestion that English physics is nevertheless visible in the Eagle's speech in the form of identifiable references to Grosseteste and Burley. However, I do not think that we are obliged to choose between assuming either that Chaucer's knowledge of physics was wholly old-fashioned – to the extent that he had no awareness of any writer on the subject more recent than Vincent of Beauvais – or that he must have had a direct and detailed acquaintance with the work of highly sophisticated thinkers like Grosseteste and Burley. I will argue that Chaucer's approach to the themes of the Eagle's speech is decisively shaped by another writer who can be shown to have links with Grosseteste, Burley and the Oxford Calculators – but who is hardly an innovative thinker on physics himself. I will also suggest that not only did this fourteenth-century writer provide Chaucer with several themes and metaphors of a broadly "scientific" kind: he also showed him how perspectives on physics could be used to effect even in contexts that are

otherwise predominantly moral or allegorical. The writer I have in mind is Robert Holcot, the Dominican friar best known for his widely circulated Commentary on the deutero-canonical book of *Wisdom*.[46] The strongest evidence for Holcot's influence on the Eagle's speech derives, perhaps surprisingly, from the one passage in *The House of Fame* that might seem least in need of any new suggestions about the nature of its sources: that is, the Eagle's description of the ripples produced when a stone is thrown into a body of water. As I have already pointed out, analogues for this passage can be found in both Boethius and Vincent of Beauvais. However, there is also a direct parallel for it in Holcot's *Wisdom*-commentary, a parallel which seems

[46] There is no modern edition of the *Wisdom*-commentary. I have used the Hagenau 1494 edition (repr. in facsimile: Frankfurt-a-M: Minerva, 1974) [henceforth **H**]; the Venice 1509 edition [**V**] (available online via the Bayerische Staatsbibliothek: http://reader.digitale-sammlungen.de/resolve/display/bsb10148926.html [accessed: 23rd January, 2017]; and the the MS copy of the *Wisdom*-commentary in Oxford, Balliol College, MS 27 [**O**] (using the photographs available at https://www.flickr.com/photos/balliolarchivist/sets/72157641118102464/ [accessed: 23rd January, 2017]. For a list of manuscripts and early printed editions of this work, see Friedrich Stegmüller, *Repertorium biblicum medii Aevi*, 11 vols (Madrid: Consejo Superior de Investigaciones Científicas, 1950–80), 5: 143–47, no. 7416. On Holcot generally, see Beryl Smalley, *English Friars and Antiquity in the Early Fourteenth Century* (Oxford: Blackwell, 1960); and, more recently, Jenny Swanson, "Holcot, Robert (c.1290–1349)," in *ODNB*, article 13485. On his theological *Quodlibeta*, see Richard E. Gillespie, "Robert Holcot's Quodlibeta," *Traditio* 27 (1971) 480–90; and Hester Goodenough Gelber, *Exploring the Boundaries of Reason: Three Questions on the Nature of God, by Robert Holcot, OP* (Toronto: Pontifical Institute of Mediaeval Studies, 1983).

to have been noticed in Chaucerian scholarship only relatively recently.[47] Holcot's use of the ripples-on-the-water analogy in Lection 193 of this commentary is, in fact, remarkably close in phrasing to Chaucer's, much closer even than seems to have been realized, and in several respects noticeably closer to what the Eagle says than the corresponding passages in either Boethius or Vincent of Beauvais.

In Holcot's *Wisdom*-commentary Chaucer would have found a convenient summary, not just of Aristotle's thinking on the physics of the sound, but also of the refinements on it offered by Aristotle's great "Commentator", Averroes:

> Naturale autem generationem ipsius Echo declarat Aristoteles .ii. *De Anima*, textu[48] correspondente commento .viii. Est enim secundum Commentatorem "iteratio soni conseruando figuram suam":[49] et fit ab aere percusso et sonante cum reflexione ad aliquid obstaculum maxime concauum. Ponit autem ad hoc exemplum Aristoteles de lumine: Lumen multiplicatum in aere et reflexum ad aliquod politum [50] reflectitur versus illam partem in qua generatur, sicut manifestum est in corpore luminoso quod illuminatur, non solum per radios incidentes, sed per radios reflexos; aliter[51] esset vmbra[52]

47 John M. Fyler, *Language and the Declining World in Chaucer, Dante and Jean de Meun* (Cambridge: Cambridge University Press, 2007), 151, and 250, n. 173. Fyler's observation is noted in Havely's new edition, n. to lines 787–822, 184–85.

48 textu] **O**; **HV** *om.*

49 Averroes, *Commentarium Magnum*, 419b25–419b33, ed. Crawford, 251.

50 Ponit autem ad hoc exemplum Aristoteles de lumine: Lumen multiplicatum in aere et reflexum ad aliquod politum] **HV** Ponit autem flexum ad aliquod corpus politum et tersum **O**

51 aliter] **HV**; alias **O**

vbicumque non incidunt radii solis. (Lection 193: **V**, fol. 164ra; **O**, fol. 286rb)[53]

Aristotle explains the natural origins of this "Echo" in the second book of *On the Soul*: [see also] the corresponding commentary, distinction 8 [*recte* 80], for according to the Commentator [i.e. Averroes] Echo is "the repetition of sound in such a way as to conserve its shape", and it is made out of air which has been struck and which resounds when it is reflected towards any obstacle that is as concave as possible. Indeed, in relation to this Aristotle suggests an analogy with light.[54] Light that is multiplied in air and thrown onto any polished surface is reflected back towards the point at which it is generated, just as is evident in the case of a luminous body that is illuminated not only by rays [of light] striking directly, but also by rays that are reflected: otherwise there would be shadow wherever the rays of the sun do not strike.

It is at this point in his discussion of the physics of sound that Holcot introduces the analogy with the ripples created on the surface of a body of water by a falling object:

52 vmbra] **HV** tenebra **O**

53 There are no page-numbers in **H**.

54 Fyler seems to think that Holcot is misguidedly referring at this point to some Aristotelian work called "de Lumine" (*Language*, 250, n. 173), but this is not the case. Holcot's reference is to Aristotle, *On the Soul*, Book II, cap. 8, 419^{b}, trans. Smith, in Barnes, 1:668: "What happens here must be analogous to what happens in the case of light: light is always reflected – otherwise it would not be diffused and outside what was directly illuminated by the sun there would be blank darkness."

Aliud exemplum est in aqua. Si enim lapillus proiicatur in aquam, fiunt multe circulationes vbi cecidit[55] lapillus et minor circulus[56] pellendo causat maiorem et ille[57] alium, et sic deinceps[58] donec deficiat virtus primi pellentis.[59] Si autem circulationes ille occurrant alicui obstaculo priusquam virtus[60] primi pellentis deficiat, repercutiuntur:[61] et fiunt circulationes versus locum vbi prima percussio facta est per lapidem. (Lection 193: **V**, fol. 164ra–b; **O**, fol. 286rb–ra)

Another example of this is in water: for if a pebble is thrown into water, this creates many circles where the pebble fell; and each smaller circle causes the [next] larger one by impelling it outwards, and this then causes the next [larger one], and so on successively, until the force of the initial impulsion is exhausted. If, however, these circles run into any obstacle before the force of the first impulsion is exhausted, they are bounced back, and the circles return towards the point where the initial impact was made by the stone.

Averroes makes use of this same analogy in the chapter immediately before the one that Holcot cites;[62] and it may well be that Holcot's own use of this analogy was

55 circulationes vbi cecidit] **HV** circulationes quarum centrum est locus vbi cadit **O**

56 circulus] **HV** circulatio **O**

57 ille] **HV** illa **O**

58 deinceps] **HV**; **O** *om.*

59 pellentis] **HV**; inpellentis **O**

60 virtus] **HV**; **O** *om.*

61 repercutiuntur] **HV**; et repercutiuntur **O**

62 Averroes, *Commentarium Magnum*, 419b, ed. Crawford, 248 (cited above, n. 49).

most directly prompted by Averroes, rather than Boethius or Vincent of Beauvais,[63] neither of whom he mentions at this point.

In order to describe the effect of the stone falling the water Holcot repeatedly uses the terms "circulationes" and "circulus", and *The House of Fame* could be taken to reflect this in its use of the word "sercle" at lines 791, 794 and 796. Vincent of Beauvais likewise makes repeated use of the word "circulus", but only in relation to sound in general, not when describing the spread of ripples as such. Even more striking, however, is the fact that Holcot specifically says that each of these circular ripples *causes* ("causat") the next one, since "cause" also seems to have been a key-term in this context for Chaucer too. Neither Boethius, Vincent of Beavais nor Averroes refer specifically to "cause" in relation to the ripples created by a stone falling into water, whereas Chaucer's Eagle uses the term three times in quick succession (at lines 794, 796 and 800). Holcot also seems to have provided Chaucer with another term that is very prominent in the Eagle's speech: that is, "multiplication" (which appears at lines 784, 801, and 820).[64] Again, there is no

[63] Boethius, *De institutione*, Book I, cap. 14, ed. Friedlein, 200, trans. Bower, 21, and Vincent of Beauvais, *Speculum*, Book 5, cap. 17 (both cited above, n. 15).

[64] Following Fyler (*Language*, 151), Havely notes that both Chaucer and Holcot refer to multiplication in this context (n. to lines 787–822, 184–85), but he also suggests that "There may be an allusion here to Robert Grosseteste" (n. to line 784, 184), on the grounds that "'multiplication of species' or 'virtue' was part of his [Grosseteste's] optical theory". This comparison does not seem to me particularly compelling – or at least not so compelling as the comparison with Holcot's *Wisdom*-commentary. Nor am I persuaded by Havely's further suggestion (in his n. to line 784) that Chaucer's "interest in the notion of multiplicity (versus

precedent for this in Boethius, Vincent or Averroes: however, Holcot says: "In the same way [as in the case of the ripples on the water], when sound is created in the air by the impact of something on something else, then that sound is *multiplied*, and it generates another sound, and this other sound generates another sound [and so on], radiating outwards, as long as the strength of the initial impact lasts" ("Eodem modo, quando[65] ex percutiente et percusso[66] sit sonus in aere, ille sonus *multiplicatur* et sonus iste generat alium et ille alium[67] circulariter, quamdiu durat virtus primi percutientis": Lection 193: **V**, fol. 164rb; **O**, fol. 286va). Holcot's particular emphasis on both "cause" and "multiplication" in his account of the ripples on the water seems to be the immediate explanation for the Eagle's prominent repetition of these very terms in the course of his own use of this analogy (which I cite here with these key words in bold):

> Now, hennes-forth y wol the teche
> How every speche or noyse or soun,
> Thurgh hys **multiplicacioun**,
> Thogh hyt were piped of a mouse,
> Mote nede come to Fames house.
> I preve hyt thus (take hede now)

unity) may well have been further stimulated by his reading about unity and diversity in Book 3 of Boethius's *Cons[olation of Philosophy]* (cf. *Boece* 3, prosa II. 16–73)".

65 quando] **HV**; **O** *om.*

66 percusso] **HV**; percussio **O**

67 ille alium] **HV**; ille alius alium **O**

By experience – for yf that thow

Throwe on water now a stoon,

Wel wost thou, hyt wol make anoon

A litel roundell, as a sercle –

Peraventure brode as a covercle –

And ryght anoon thow shalt see wel,

That sercle wol **cause** another whele

And that the thridde, and so forth, brother,

Every sercle **causynge** other,

Wydder than hym self was.

And thus, fro roundel to compas,

Eche aboute other goynge,

Causeth of othres sterynge,

And **multiplyinge** ever moo,

Til that hyt be so fer y-goo

That hyt at bothe brynkes bee. […]

As I have of the watir preved –

That every cercle **causeth** other –

Ryght so of ayre, my leve brother:

Everych ayre other stereth

More and more, and speche upbereth,

Or voys or noyse or worde or soun,

Ay through **multiplicacioun**,

Til hyt be atte House of Fame… (*House of Fame*, 782–803, 814–21)

These parallels are suggestive in themselves, and they clearly indicate that, even if Chaucer were aware of the use of the ripples-on-the-water analogy by Boethius, Vincent of Beauvais or Averroes, it is probably Holcot whose influence on Chaucer at this point was most direct. Yet it is perhaps the broader context in which Holcot discusses the physics of sound that is most suggestive about the nature of the relationship between the two English writers. Holcot's discussion of the nature of sound in the *Wisdom*-commentary comes as part of his analysis of "Echo", which, he emphasizes, is open to discussion from at least two distinct perspectives, the one "natural" (*naturale*, or what might be called "scientific") and the other "fabulous" (*fabulosum*, i.e. derived from classical mythology): "Circa generationem Echo notanda[68] sunt duo: vnum est naturale, aliud fabulosum" (Lection 193: **V**, fol. 164ra; **O**, fol. 286rb). Having offered us his account of the "natural" approach to the theme of echoes (by means of the analogy with the ripples on the water), Holcot then switches directly to the "fabulous":

> Fabulose loquendo[69] Echo narrat Ouidius .iii. *Methamorphoses.*[70] Fuit enim virgo quedam mire eloquentie, que Junonem longa narratione[71] detinere solebat, dummodo Jupiter in montibus adulteria sua fecit cum puellis. Impediebatur igitur Juno per narrationes ipsius Echo ne deprehendere posset

68 notanda] **HV**; videnda **O**

69 fabulose loquendo] **HV**; fabulosum ortum ipsius **O**

70 Ovid, *Metamorphoses*, III.359–510, ed./trans Frank Justus Miller, 2 vols (Cambridge MA: Loeb, 1984), 1: 148–61.

71 longa narratione] **HV**; longis narrationibus **O**

istas puellas, ipsis fugientibus Junone detenta per narrationes ipsius Echo. Tandem Juno hoc percepto, "'Huius' ait, 'lingue que sum decepta[72] potestas./ Parua [73] tibi dabitur [74] vocisque breuissimus vsus.'" [75] Priuauit eam vsu loquendi, hoc solum sibi relinquens quod fines verborum ingeminat. Hec ergo Echo Narcissum iuuenem adamauit pulcherrimum, sed [76] ab eo repellitur. "Spreta latet siluis pudibundaque[77] frondibus ora/ Protegit et solus ex illo viuit in antris."[78] Fatigans[79] igitur eam amore, dolore et pudore cuius[80] corpus totum euanuit preter vocem et ossa. Ossa vero conuersa sunt in saxa et tandem[81] sola vox remansit que vocatur "Echo". (Lection 193: **V**, fol. 164rb; **O**, fol. 286va)

In mythological terms, Ovid tells the story of Echo in the third book of *Metamorphoses*. There was once a young woman of wonderful eloquence, who was accustomed to detain Juno with long drawn-out story-telling all the time that Jupiter was in the mountains committing adultery with his girlfriends. In

72 decepta] **HVO**; delusa *Ovid*

73 Parua] *Ovid*; Praua **HVO**

74 Dabitur] *Ovid,* **O**; Datur **HV**

75 Ovid, *Metamorphoses*, III.366–67, ed./trans. Miller, 1:150–51.

76 sed] **HV**; **O** *om.*

77 pudibundaque] **HV**; putibundaque **O**

78 Ovid, *Metamorphoses*, III.393–94, ed./trans. Miller, 1:152–53.

79 Fatigans] *Ovid*; Fatigantibus **HVO**

80 cuius] **HV**; **O** *om.*

81 tandem] **HV**; sic tandem **O**

> this way Juno was prevented by the stories of this Echo from being able to catch any of these girls, for they fled from her while she was being detained by Echo's stories. "'That tongue of thine [she said], by which I have been [deceived] shall have its power curtailed and enjoy the briefest use of speech." Juno deprived Echo of the power of speech leaving her only the power to repeat the ends of words. So then this Echo fell in love with the beautiful Narcissus, but was rejected by him. "Thus spurned, she lurks in the woods, hides her shamed face among the foliage, and lives from that time on in lonely caves." In this way exhausted by love, grief and shame, her whole body vanished [into thin air] apart from her voice and bones.[82] Her bones were changed into rocks, and at length only her voice remained, which is what we call "Echo".

In essence, what Holcot does here is to yoke together precisely the same two modes of thinking that come together to such incongruous effect in the Eagle's speech in *The House of Fame*: that is, the *naturale* and the *fabulosum* – the "scientific" and the "mythological". Just as Holcot chooses to read Echo both as a phenomenon in nature and as an invitation to analyse the moral dimensions of the classical legend of Echo, so too Chaucer presents us with the Eagle, who is simultaneously both a vehicle for what seems to be a determinedly scientific account of the mechanics of sound and a figure straight out of classical mythology. In other words, what Holcot

[82] Cf. the Franklin's Tale, V. 951–52: "And dye he moste, he seyde, as dide Ekko/For Narcisus, that dorste nat telle hir wo."

offers Chaucer here is a precedent not just for the particular analogy of the ripples on the water, but also for the explicit conjunction of "mythology" with "science".[83]

Such conjunctions are by no means unusual in the *Wisdom*-commentary. Another example can be found in Lection 187, where Holcot discusses Ovid's characterisation of the House of Envy in the second book of the *Metamorphoses*. According to Holcot:

> Vult ergo dicere quod domus inuidie est situata in vallibus pro tanto quod[84] persone humiles inuident[85] superioribus, et omnis inuidus ideo inuidet, quia se inferiorem alio in aliquo quod appetit esse videt. Inferior planeta eclipsat superiorem, et non econtra, sicut patet de luna et sole, et ita regulariter illi qui minus valent et sunt gratiis et meritis inferiores obumbrare nituntur per inuidiam meliores. (Lection 187: **V**, fol. 159ra; **O**, fol. 277rb–va)
>
> [Ovid] chooses to say that the House of Envy is situated in a valley [*in vallibus*][86] because of the way that lesser folk envy their superiors; and every

[83] I should emphasise that this reading of Holcot's influence on Chaucer is not intended to be exclusive. There are other medieval authors who make use of something like this conjuncture of the *naturale* and the *fabulosum*: see, for example, the *Roman de la Rose*, lines 18013–18091, ed. Daniel Poirion (Paris: Flammarion, 1974), 481–82, where references to scientific authorities like Aristotle and Alhazen are pointedly juxtaposed with mythological figures like Mars and Venus.

[84] quod] **HV**; quia **O**

[85] inuident] **HV**; semper inuident **O**

[86] Ovid, *Metamorphoses*, II.761–62, ed./trans Miller, 1:112–113: "domus est imis in vallibus huius/ abdita" ("her home was hidden away in a deep valley").

> envious person is envious because he sees himself to be inferior to another in something that he desires. A lesser planet eclipses a greater, not vice versa, just as is clear in regard to the sun and the moon: and so it regularly happens that those who are worth less, and are inferior in their virtues and their merits strive to overshadow their betters through envy.

Here again we find that seemingly incongruous conjunction between the *fabulosum* and the *naturale*: between the imaginative world of classical literature, that is, and the physical world of bodies moving in the cosmos. As it happens, Chaucer's description of the House of Fame's nearby annex, the House of Rumour, also includes the idea that it was situated in a valley ("Tho saugh I stond in a valeye,/ Under the castel, fast by,/ An house": 1918–20), and it is possible that Chaucer was particularly encouraged to include this detail by its prominence in Holcot's discussion of Ovid's allegorical architecture, as well as – or possibly even wholly instead of – Ovid's own text. Just as Holcot here uses the idea of movement of planets in eclipses in order to explain the architecture of a particular ethical/mythical construct (the House of Envy), so too, it could be argued, Chaucer uses the idea of the physical movements of sound-waves in order to explain the architecture of what is, in effect, a parallel and related concept (the House of Fame).

IV. The Place of Robert Holcot in Fourteenth-century Intellectual Culture

What, however, is the wider significance of these correspondences? What is the nature of the relationship between Chaucer and Holcot – or for that matter, between

Holcot and Grosseteste, Burley or the Oxford Calculators? Born around 1290, Robert Holcot was a contemporary of many of the Calculators: his career, like those of two of the most important Calculators, Bradwardine and Dumbleton, was cut short by the Black Death of 1348/1349. In Oxford from at least 1326, he held the Dominican chair of theology there in 1334, followed by a second regency in Cambridge; and at some point after this he became part of the literary and book-collecting circle that gathered around the Bishop of Durham, Richard Bury.[87] Bury is now best known to literary history as the putative author of a work called *Philobiblon* (or *The Love of Books*),[88] although in fact there is some evidence that Holcot was also involved in its authorship, to the extent that "we shall never know […] how much of *Philobiblon* is Holcot's and how much de Bury's".[89] The group around Bury is described in the *Dictionary of National Biography* as "the single most notable circle or sequence of scholars under the patronage of one person in fourteenth-century England." Among its members were the Oxford Calculators Thomas Bradwardine and Richard Kilvington – and also Walter Burley.[90] Some idea of this circle's

87 On Bury, see N. Denholm-Young, "Richard de Bury (1287–1345)," *Transactions of the Royal Historical Society*, 4th Series, Vol. 20 (1937): 135–168; Christopher R. Cheney, "Richard de Bury, Borrower of Books," *Speculum* 48 (1973): 325–28; W.J. Courtenay, *Schools and Scholars*, 133–37; W. J. Courtenay, "Bury, Richard (1287–1345)," *ODNB*, article 4153.

88 *Philobiblon: Richard de Bury: The Text and Translation of E.C. Thomas*, ed. Michael Maclagan (Oxford: Blackwell, 1970).

89 Smalley, *English Friars*, 67. See, however, Maclagan, xxxv–xxxvii.

90 In addition to these three men (and of course Holcot), Bury's "household" between 1334 and 1345 seems to have included such figures as Richard Bentworth, Richard Fitzralph, Walter Segrave, John Maudith and John Aton. On Fitzralph, see Katherine Walsh, *Richard Fitzralph in*

activities might be deduced from the *Philobiblon*, where Bury says (or is imagined by Holcot to say):

> …ab aetate tenera magistrorum et scholarium ac diversarum artium professorum quos ingenii perspicacitas ac doctrinae celebritas clariores effecerant, relegato quolibet partiali favore, exquisitissima sollicitudine nostrae semper coniunximus comitivae, quorum consolativis colloquiis confortati, nunc argumentorum ostensivis investigationibus, nunc physicorum processuum ac catholicorum doctorum tractatuum recitationibus, nunc moralitatum excitativis collationibus, velut alternatis et multiplicatis ingenii ferculis, dulcius fovebamur.
>
> From our early years we attached to our society with the most exquisite solicitude and discarding all partiality all such masters and scholars and professors in the several faculties as had become most distinguished by their subtlety of mind and the fame of their learning. Deriving consolation from their sympathetic conversation, we were delightfully entertained, now by demonstrative chains of reasoning, now by the recital of the physical processes and the treatises of the doctors of the Church, now by stimulating

Oxford, Avignon and Armagh (Oxford: Clarendon, 1981), and "Fitzralph, Richard (*b.* before 1300, *d.* 1360)," *ODNB*, article 9267; on Maudith, J. D. North, "Maudith , John (*d.* in or after 1343)," *ODNB*, article 18362; on Aton, F. Donald Logan, "Aton, John (*d.* 1349)," *ODNB*, article 75.

> discourses on the allegorical meaning of things as by a rich and well-varied intellectual feast.[91]

The recital of the "physical processes" (*physicum processuum*) mentioned here might even be read as a direct reference to something very like the scientifically educational lecture that Chaucer's Eagle attempts to provide; while the *moralitatum excitative collationes* (literally, "stimulating assemblages of moral ideas") clearly imply a reference to some form of allegory, as E.C. Thomas's translation assumes ("stimulating discourses on the allegorical meaning of things").

While Holcot is very likely to have known Burley personally (as a fellow member of the Bury circle), the evidence is also very strong that he knew at least some of Grosseteste's work. Apart from anything else, he says that he did. He refers directly to Grosseteste as "Linconiensis" (i.e. as Bishop of Lincoln) in his Commentary on Peter Lombard's *Sentences*;[92] and in Lection 83 of the *Wisdom*-commentary, he copied

[91] *Philobiblon*, ed. Maclagan, 86–87.

[92] Holcot, Commentary on the *Sentences*, II, q. 2: "Aliter aliqui dicunt ad istud argumentum quod vna multitudo infinita est maior alia: et concedunt quod plures fuerent reuolutiones lune quam solis. Dicunt etiam quod sicut inter ternarium et binarium est sesquialtera proportio: ita inter ternarios infinitos et binarios infinitos est sesquialtera proportio: et infinito potest fieri additio. Et hec opinio est Linconiensis super librum physicorum." According to Pierre Duhem: "The last assertion seems completely false: Robert Grosseteste says nothing not purely Aristotelian on the subject of the infinite in his Summa (which is so concise, so full of ideas), and nothing in particular that resembles what Holkot attributes to him" (*Pierre Duhem: Medieval Cosmology: Theories of Infinity, Place, Time, Void, and the Plurality of Words*, ed./trans. Roger Ariew (Chicago: University of Chicago Press, 1985), 103). Duhem's view is contradicted by Neil Lewis ("Robert Grosseteste's *Notes on Physics*," 120), who interprets this passage as a

an extensive passage almost verbatim from Grosseteste's *Dictum* 91, which he also ascribes to "Linconiensis".[93] In addition, Lection 100 includes a whole section borrowed word for word from Grosseteste's *Dictum* 60, although here Holcot seems to have thought that he was quoting from the work of Alexander Nequam.[94] From this perspective, Grennen's suggestion of Chaucer's indebtedness to Burley and Grosseteste is not so far off the mark after all. Whether or not Chaucer knew the work of either of these authors directly, it seems that he had access, in Holcot, to someone who largely shared their intellectual horizons.

These days, however, Holcot is probably best known, not for his membership of the Bury Circle, or for his knowledge of Grosseteste, but for the leading part he plays in two other important fourteenth-century contexts.[95] Firstly, he is generally regarded

direct reference to Grosseteste's *Notes on Physics* – although he mistakenly refers to Holcot as "John Holcot".

93 The passage in question occupies most of the final third of Holcot's Lectio 83. An edition of Grosseteste's *Dictum* 91 can be found at the *Electronic Grosseteste* web-site (cited above, n. 19): the material borrowed by Holcot can be found at fols 69vb–70ra in the base-text for this edition, Oxford, Bodleian Library MS Bodley 798.

94 The relevant passages are printed below, in the Appendix. On *Dictum* 60, see also Servus Gieben, "Traces of God in Nature according to Robert Grosseteste," *Franciscan Studies* 24 (1964): 144–58.

95 From the point of view of the history of English literature, Holcot is also interesting as the only medieval writer who apparently shows a knowledge of the first long comic poem in the English language, the thirteenth-century poem known as *The Owl and the Nightingale* (ed./trans. Neil Cartlidge (Exeter: University of Exeter Press, 2001; repr. 2003)). This observation was

as one of the principal theological antagonists of Thomas Bradwardine: specifically, as one of the philosophers that Bradwardine chose to represent in *De causa Dei* as "Pelagians" (that is, philosophical sceptics in the tradition of Ockham), and against whom the *De causa Dei* was apparently directed.[96] For Bradwardine, whose views on the relationship between divine grace and human free will could certainly be said to veer towards theological determinism, Holcot seems to have been something of a *bête noire*, since, even by the standards of Ockham's followers, Holcot's scepticism was particularly strongly stated. [97] In his *Sentences*-commentary he even argued for the

made by Alan J. Fletcher in "The Genesis of *The Owl and the Nightingale*: A New Hypothesis," *Chaucer Review* 34 (1999): 1–17, at 2–4.

[96] See Gordon Leff, *Bradwardine and the Pelagians: A Study of his 'De Causa Dei' and its Opponents* (Cambridge: Cambridge University Press, 1957), esp. 221; Baker, "Literature, Logic and Mathematics," 49, 107–32; William J. Courtenay, *Schools and Scholars*, 294–303; Calvin Normore, "Future Contingents," in Norman Kretzmann, et al. (eds), *The Cambridge History of Later Medieval Philosophy* (Cambridge: Cambridge University Press, 1982), 358-81, at 373–77; Lukács, 33–36. On Holcot's relationship with Ockham, see E.A. Moody, "A Quodlibetal Question of Robert Holkot, O.P. on the Problem of the Objects of Knowledge and of Belief," *Speculum* 39 (1964): 53–74.

[97] Cf. Holcot's *Wisdom*-commentary, Lectio 147 (**V**, fol. 128rb; **O** [here Lection 148], fol. 222vb): "Multi confitentur iniquitatem suam, sed aduersus Deum. Quando enim inueniuntur in peccatis, [non (**O**; **HV** *om.*)] dicunt 'Non feci hoc, aut non est hoc peccatum', sed 'Deus voluit'. Alii dicunt, fatum mihi fecit. Stelle mihi fecerunt et ita per circuitum nituntur venire ad accusandum Deum. Stellas enim ipse fecit et ordinauit.' Et ita per eas voluit ostendere quod Deus fecit vt peccarent. Sed vere penitens dicit 'Ego peccaui, non fatum, non fortuna, non Diabolus me coegit: sed ego persuadenti consensi.' Hec Glosa: Vere igitur penitentes

rather disconcerting proposition that God can lie and deceive, and that he can do so without impairing his perfection in any way.[98] Such anti-determinism may well have appealed rather strongly to Chaucer, the poet who includes in Book IV of *Troilus and Criseyde* an extended illustration of the folly of narrow fatalism.[99] Secondly, Holcot is known for his membership of group that Beryl Smalley long ago labelled as the "classicizing friars": a group of English writers characterized by a conspicuous penchant for incorporating classical material into what were essentially devotional and pastoral texts. Smalley considered Holcot the most "diversely gifted" of all these fraternal writers: and indeed "no medieval moralist", she adds, "ever had a stronger sense of humour" than Holcot did.[100] The *Wisdom*-commentary is an undeniably engaging and accessible text, as well as an instructive one, which means that it is not hard to see why it eventually became, in Jenny Swanson's words, "one of the most popular commentaries of the late middle ages".[101] As Swanson explains, it "made [Holcot's] name famous throughout medieval Europe, and surviving catalogues show

precogitant et deliberant quomodo possint semetipsos accusare: [sed (**O**; **HV** *om.*)] false penitentes deliberant quomodo possint Deum accusare [et excusare seipsos (**O**; **HV** *om.*)]."

98 Holcot, Commentary on the *Sentences*: "nullum inconveniens video si dicatur quod Deus possit iurare falsum vel promittere se facturum et non facere, sicut potest homo"; Baker, "Literature, Logic and Mathematics," 117–18.

99 On Troilus's fatalism in *Troilus and Criseyde*, see A.J. Minnis, *Chaucer and Pagan Antiquity* (Cambridge: Brewer, 1982), 93–99.

100 Smalley, *English Friars*, 73. On Holcot's sense of humour, see also Katherine H. Tachau, "Looking Gravely at Dominican Puns: the 'Sermons' of Robert Holcot and Ralph Friseby," *Traditio* 46 (1991): 337–345.

101 Jenny Swanson, "Holcot, Robert (c. 1290–1349)," *ODNB*, article 13485.

that every well-stocked library came to have a copy."[102] Nevertheless, the book's popularity waned in the sixteenth century; and the *Wisdom*-commentary is now (arguably) the most widely circulated and culturally significant medieval English text never to have appeared in a complete modern edition.

V. HOLCOT AND CHAUCER

The possibility that Chaucer was a reader of Holcot's *Wisdom*-commentary has, in fact, long been recognised. Some of the strongest evidence for it comes from the fact that Chaucer's discussion of dreams and their significance in the Nun's Priest's Tale seems to have been substantially influenced by several passages in the *Wisdom*-commentary. Both of the stories told by the cock Chauntecleer in support of the idea that dreams can be predictive of the future are found in the commentary (Lections 102 and 201);[103] and it was probably directly from Holcot that Chaucer took them, rather than Holcot's own principal source, Valerius Maximus. Indeed, Robert Pratt asserts that:

[102] Cf. J.C. Wey, "The *Sermo finalis* of Robert Holcot," *Mediaeval Studies* 11 (1949): 219–23, at 219: "As the author of [the…] commentary on the *Book of Wisdom* Holcot became famous over night and his fame held throughout the next two centuries."

[103] Kate O. Petersen, *On the Sources of the 'Nonnes Preestes Tale'* (Boston: Radcliffe College, 1892); Robert A. Pratt, "Some Latin Sources of the Nonnes Preest on Dreams," *Speculum* 52 (1977): 538–70. Pratt refers to these Lectiones as 103 and 202 (rather than 102 and 201) because he based his reading of Holcot primarily the manuscript-copy of the *Wisdom*-commentary in Oxford, Balliol College MS 27 [**O**], where the numbering is slightly different.

> In Holcot's fascinating Wisdom commentary [Chaucer would have] found opposing views on dreams and divination which he developed into stupendous mock-heroic discourses. He rifled Holcot – especially the sections on significative dreams – for Pertelote's discussion of humors and for most of Chauntecleer's argument.[104]

Given the energy with which Pratt argues for Chaucer's dependence on the *Wisdom*-commentary for his material on dreams and divination, it seems rather surprising that Chaucerians have not sought more intensively for further examples of Chaucer's "rifling" of Holcot. [105] I have recently tried to lend support to Pratt's case for

[104] Pratt, "Some Latin Sources," 569.

[105] In the past A.J. Minnis has presented Chaucer's knowledge of the *Wisdom*-commentary as a certainty, stating bluntly that "[Robert Holcot's…] popular commentary on the Book of Wisdom was known to Chaucer" (*Chaucer and Pagan Antiquity*, 3); cf. *Medieval Theory of Authorship*, 165: "Chaucer seems to have made use of Holcot's Wisdom-commentary when writing his *House of Fame* and the Nun's Priest's Tale". In support of these assertions he cites Petersen and Pratt (see n. 101 above), and (for the *House of Fame*) Sypherd, *Studies*, 74–76, but adds no specific evidence of Chaucer's use of Holcot himself. More recently, his views seem to have shifted a little: he expresses scepticism about Pratt's case for Chaucer's use of Holcot, but adds "let that pass for now: in principle I see no reason why Chaucer should or could not have read Holcot's Wisdom commentary" ("Looking for a Sign: the Quest for Nominalism in Ricardian poetry," in *Translations of Authority in Medieval English Literature: Valuing the Vernacular* (Cambridge: Cambridge University Press, 2009), 38–67, at 40). William H. Watts argues that "the case for Holcot's influence on Chaucer is less clear-cut than the near-universal acceptance of the *Wisdom Commentary* as a source for *The Nun's Priest's Tale* would seem to suggest. While Petersen and Pratt are able to point to parallels between the *Commentary* and

Chaucer's knowledge of Holcot by pointing out that the friar's influence is probably directly visible in the rather austere attitude that Chaucer takes in the *Canterbury Tales* towards parental, and particularly paternal, responsibility. So, for example, there is a close correspondence between Chaucer's Physician's warning that parents should be careful not to encourage immorality in their children either "by ensample of youre lyvynge/Or by youre necligence in chastisynge" and Holcot's assertion in Lection 41 that when children turn out to be immoral it is either "Tum propter parentum imitationem, tum propter defectum castigationis" (either due to imitating their parents, or to a lack of chastisement).[106] It is also the case that in the Merchant's Tale January's assertion that a man ought to "Take… a wyf with greet devocioun,/ By

the *Tale*, there is little in Chaucer's work that must of necessity come from Holcot. The argument for Holcot's influence rests largely on similarities on verbal choices, in the structure of the argument, and in the narrative details Chauntecleer deploys in the exemplary tales that support his case for the prophetic value of dreams, but it would seem that these similarities can be accounted for without resorting to Holcot"; and he suggests (unconvincingly in my view) that Chaucer is unlikely to have made use of the works of clerks like Holcot if only because "we find in Chaucer's poetry, a kind of anti-clericalism, focused not on the worldly abuses of the religious orders but on the hubris and misdirected studies of clerks" ("Chaucer's Clerks and the Value of Philosophy," in *Nominalism and Literary Discourse: New Perspectives,* ed. Hugo Keiper, Christoph Bode and Richard J. Utz (Amsterdam: Rodopi, 1997), 145–55, at 152–53). More recently, Peter Brown has argued that the influence of Holcot's *Wisdom*-commentary is visible in Chaucer's treatment of optics (*Chaucer and the Making of Optical Space* (Bern: Lang, 2007), esp. pp. 107–108, 159–60, 311).

[106] Neil Cartlidge, "Wayward Sons and Failing Fathers: Chaucer's Moralistic Paternalism – and a Possible Source for the Cook's Tale," *Chaucer Review* 47 (2012): 134–60, at 146–47.

cause of leveful procreacioun/ Of children to th'onour of God above" at least resembles the phrasing of Holcot's argument in Lection 37 that the generation of children should occur within the boundaries of marriage 'in order to honour God' ("prolis propagatio ad laudem Dei").[107] A further close verbal correspondence can be found in the two writers' accounts of the story of Phaethon. Chaucer concludes his version by asking:

> Loo, ys it not a mochil myschaunce
> To lat a fool han governaunce
> Of thing that he can not demeyne? (*House of Fame*, lines 957–59)

The particular phrasing of this rhetorical question seems to be a direct reflection of Holcot's observation in Lection 8 of the *Wisdom*-commentary that "This is what might happen to those fools and presumptuous people who complain about divine governance" ("Ita contingeret de istis *fatuis* et presumptuosis qui de diuina *gubernatione* murmurant"; my italics).[108] However, the case for Chaucer's dependence on Holcot rests not just on close verbal correspondences such as these, but also on the sheer accumulation of themes and motifs common to the two writers. So, for example, in Lection 191 of the *Wisdom*-Commentary, Holcot tells the story of Ceyx and Alcyone, which Chaucer also uses in the *Book of the Duchess* (lines 62–230). In Lection 197, he discusses the "Dulcarnoun", the Euclidian axiom to which Pandarus makes reference

[107] Cartlidge, "Wayward Sons," 147, n. 35.

[108] Lection 8: **V**, fol. 9vb. This sentence is in a passage omitted in **O**.

in *Troilus and Criseyde* (III.931).[109] And in Lection 16, he cites the case of the poet who is so moved by his feelings as to address his beloved's deserted house (the rhetorical device of *paraclausithyron*) much as Troilus does in *Troilus and Criseyde* (V.540–53).[110] In these cases, the verbal correspondences are not so close as to add much weight individually to the idea that Chaucer was making use of the *Wisdom*-commentary, but cumulatively they support the impression that, intellectually and imaginatively, the two writers inhabited very much the same world.

In the light of all this, the most efficient explanation for the parallels between Chaucer's use of the ripples-on-the-water analogy and Holcot's use of this same analogy is surely that Chaucer knew the *Wisdom*-commentary, and that he used it in the composition of the Eagle's speech. Indeed, many of the general principles of the Eagle's physics are at least implicit in Holcot's commentary;[111] and there is probably no need to assume that Chaucer's learning (either in classical literature or in fourteenth-century physics) necessarily extended very much beyond it. It may be that Chaucerian scholars have actually played into the poet's hands by attempting to

[109] See Thomas Elwood Hart, "Medieval Structuralism: 'Dulcarnoun' and the Five-Book Design of Chaucer's 'Troilus'," *Chaucer Review* 16 (1981): 129–70; and Baker, "Literature, Logic and Mathematics," 178–80.

[110] This particular parallel was noted by Smalley (*English Friars*, 169–70). See also Morton W. Bloomfield, "Troilus' Paraclausithyron and Its Setting," *Neuphilologische Mitteilungen* 73 (1972): 15–24. He discusses the possibility that Chaucer was at this point borrowing from Holcot at 18–19, remarking: "It now seems very probable that Chaucer knew Holcot's *Commentary on Wisdom* which was one of the popular works of the later fourteenth century" (18).

[111] Cf. e.g. "Lyghte thinge upwarde, and dounwarde charge" (*House of Fame*, lines 746) and Holcot's "Locus autem grauium est deorsum" (Holcot, *Wisdom*-commentary, Lectio 188).

identify his sources only in authorities much grander and more remote than the English friar. No doubt Chaucer would have been quite pleased to be credited with such deep erudition that he would have needed no guide to the thinking of such ancient intellectual eminences as Aristotle or Boethius.[112] However in the *Wisdom*-commentary he would certainly have found just such a guide. It would have provided him with a convenient and engagingly presented digest of themes and motifs gathered from a wide range of difference sources, which probably did much more to define his intellectual horizons than he would have liked to admit. At the same time, it could be argued that Chaucer's greatest debt to Holcot lies not so much in his adoption of any particular themes or motifs, as in what he learned from him about how to exploit them for literary effect: that is, in Holcot's demonstration of the very possibilities implicit in learned eclecticism as a kind of literary practice. What Holcot showed Chaucer, in particular, was how it might be possible to generate intellectual energy and a sense of abundance from the inventive juxtaposition of distinctly different kinds of authority. For Holcot, demonstrative eclecticism was a means of attracting and keeping the attention of his readers, and also of showing those readers (most of them, implicitly, clerks) how they too might attract and maintain the attention of their own congregations when they came to write sermons or lectures in their turn: but it also seems to be something of an end in itself, a challenge to his

[112] On Chaucer's "emphasis on ancient authority and silence or obfuscation" in relation to his true sources, and the precedents for such a practice that he might have found in another writer whose own influence he signally fails to acknowledge (in this case Giovanni Boccaccio), see B.A. Windeatt, *Oxford Guides to Chaucer: Troilus and Criseyde* (Oxford: Oxford University Press, 1992; repr. 1995), 39–40.

ingenuity and intellectual flamboyance at least as much as it was a means of exhibiting the breadth of his reading. It is perhaps in a very similar spirit that Chaucer incorporates his own displays of demonstrative, *compilator*-ish bookishness into his poetry – as, for example, here in the Eagle's speech in the *House of Fame*, but also recurrently throughout his work.[113] Thus, although it is possible, and indeed likely, that Chaucer quarried Holcot's *Wisdom*-commentary directly for some of the details of the Eagle's speech, what is perhaps most significant here is what he learned from Holcot in terms of literary technique. It may well have been Holcot in particular who encouraged Chaucer to imagine the Eagle precisely in the way he did: as a figure embodying in its very conception a clash between two very different types of authority, the classical/mythological and the scientific – the *fabulosum* and the *naturale*. Holcot is not just a source for Chaucer's acoustics, in other words, but also, and perhaps more importantly, a model for the cultivated incongruity of making Jupiter's Eagle into an expert on physics in the first place. From this perspective, the Eagle's speech is not so much an illustration of Chaucer's Aristotelianism, as of his Holcotianism.

[113] Cf. A.J. Minnis, *Medieval Theory of Authorship*, 2nd edn (Aldershot: Wildwood House, 1988), 191: "Of Chaucer's debt to several of the great medieval compilations there can be no doubt. […] My point is a different one, namely, that Chaucer was indebted to the compilers not only for their source-material and technical information but also for a literary role and a literary form. Chaucer seems to have have exploited the compilers' typical justification of their characteristic role as writers, and to have shared, to some extent, the compilers' sense of *ordinatio partium*." See also Ralph Hanna III, "*Compilatio* and the Wife of Bath: Latin Backgrounds, Ricardian Texts," in *Pursuing History: Middle English Manuscripts and Their Texts* (Stanford CA: Stanford University Press, 1996), 247–57.

APPENDIX: HOLCOT'S USE OF GROSSETESTE[114]

1. Holcot, Lection 100:[115]

Omnibus enim mobilibus mobilior est sapientia. Attingit autem ubique propter mundiciam suam. Vapor enim est virtutis dei, et emanatio quedam est claritatatis[116] *omnipotentis dei sincera, et ideo nihil inquinatum in illam incurrit.* [Sap. 24, 24-25] […] Sicut[117] enim deducit magister Alexander cognomento[118] Nequam: In omni creatura corporea quantumcumque sit modica, potest[119] ratio humana videre infinitam Dei potentiam, infinitam sapientiam et bonitatem. Verbi gratia, ut de atomo fiat exemplum. Satis enim approbat humana ratio et acceptat quod mensura potentie agentis sumatur secundum proportionem facti ad illud de quo fit. Tanta enim videtur potentia facilitatis, quantum ipsum factum excedit illud de quo fit. Cum ergo ratio inuenerit atomum esse aliquid ex nihilo et sciat quod, si atomus excederet, nihil [ad][120] infinitum excederet, concludit quod potentia ducens atomum de nihilo ad esse est infinita. Secundo videbit ratio quod[121] cum atomus sit corpus, habet inter se tres

[114] The translations here are mine.

[115] **V**, fol. 88rb; **O**, fol. 153vb–154ra.

[116] claritatis] *Vulgate*; claritas **HVO**

[117] Sicut] **HV**; Sed **O**

[118] cognomento] **HV**; **O** *om.*

[119] potest] **HV**; valoris potest **O**

[120] ad] **HV** *om.*; in **O**

[121] quod] **VO**; **H** *om.*

lineas intersecantes se ad angulos rectos: in qua sectione posito circino conscribi potest sphera super[122] atomum et videt in sphera infinitos circulos posse describi; immo infinita corpora infra spheram esse imaginabilia, et vltra infra circulos omnes figuras fore inscriptibiles, que tamen sunt infinite, super quas infinite possunt erigi demonstrationes, tam de magnitudinibus, quam de numeris. Ergo videbit ratio humana in atomo vel in flore infinitam scientiam objectiue descriptam. Infinitam vero scientiam non potest descripsisse agens quodcumque nisi sapientie infinite. Ergo humana ratio, si est bona, videbit et[123] inveniet in vno atomo infinitam sapientiam Conditoris.

For wisdom is more active than all active things: and reacheth everywhere by reason of her purity. For she is a vapour of the power of God, and a certain pure emanation of the glory of the almighty God: and therefore no defiled thing cometh into her. […] Indeed this was the reasoning of Master Alexander Nequam: that in every created body no matter how small, human reason can perceive the infinite power of God, his infinite wisdom and goodness. This is illustrated, for example, by the atom. Human reason readily sees and accepts that the productive power of anything can be measured as an amount equivalent to the proportion of the [value of] of what is produced to [the value of] what it is produced with. The extent to which [the value of] the actual product exceeds [the value of] what it is produced with is an index of the agent's effective power. Therefore, since it is reasonable to assume that an atom is something [produced] from nothing, and that, if the atom exceeds [what it is produced with], then it

[122] super] **HV**; infra **O**

[123] videbit et] **HV**; **O** *om.*

exceeds nothing to an infinite extent, so the conclusion must be that the power required to call into being [even] an atom out of nothing is infinite. Secondly, reason will see that since an atom has a body, it must have within itself three intersecting lines at right angles [i.e. it is three-dimensional]. With the compasses placed at this point, a sphere can be drawn around this atom, and [reason] sees that within the sphere an infinite number of circles can be drawn; indeed an infinite number of bodies are imaginable within the sphere, and moreover, within these circles every shape drawable can be placed (but the number of these is infinite); and on this might be rested an infinite number of proofs, both in relation to magnitudes and to numbers. Thus human reason will see even in a flower or an atom the infinity of knowledge objectively depicted. Indeed the infinity of knowledge could not be described by any agent, except that of infinite wisdom. Therefore, human reason (as long as it is good) will see and discover in even a single atom the infinite wisdom of the Creator.

2. Grossesteste, ***Dictum* 60**:[124]

Videbit enim racio investigans, quod omnis potencia mensuratur per proporcionem facti ad illud ex quo fit. Tanta est enim facientis potencia, quanto factum excedit illud ex quo fit. Omne autem aliquid, quantumcumque vile et parvum, [in][125] infinitum excedit nichilum. Igitur, cum racio invenerit attomum esse aliquid ex nichilo, et

[124] The text is taken from the *Electronic Grosseteste* (cited above, n. 19) [henceforth **eG**], which is in turn based on Oxford, Bodleian Library MS Bodley 798, fols 47rb-vb.

[125] in] **eG** *om.* The Hagenau text of the *Wisdom*-commentary seems to share the same error at this point as the copy of the *Dictum* that the **eG** uses as its base-witness.

decurrerit ab eo ad potenciam facientis, mensuraveritque eam per proporcionem facti ad illud ex quo fit, videbit attomum egressum in esse non a minori quam ab infinita potencia. Sic igitur egressus attomi in esse aliquid ex nichilo similacrum est infinite potencie efficientis.

Item, racio eadem considerans amplius inveniet attomum esse corpus, et in eo tres lineas intersecantes se ad angulos rectos, in qua sectione posito pede circino[126] describi[127] poterit sphera[128] intra attomum, et in sphera infinitos circulos et omnia corpora sphere inscriptibilia, et in circulis omnes figuras inscriptabiles circulis, que sunt infinite. Videbitque racio quod supra quamlibet illarum infinitarum figurarum potest erigi sciencia demonstrativa. Invenietque in attomo descripcionem infinite sciencie, non solum de magnitudinibus, sed eciam de numeris. Cum igitur invenerit racio attomum factum ex nichilo ab infinita potencia, videritque in attomo descripcionem infinite sciencie, perpendet eandem infinitam potenciam descripsisse in attomo a se facto infinitam scienciam. Sed non posset infinitam scienciam describere nisi per infinitam sapienciam. Videbit ergo infinitam potenciam fecisse attomum per infinitam sapienciam.

Enquiring reason will see that power can be measured as a proportion of the [value of the work] done to the means by which it is done. For the power of any agent equals the extent to which what is done exceeds that by which it is done. Every

[126] circino] circum **eG**. In this sentence, Holcot's version of this passage produces a better text than the one printed in the **eG**.

[127] describi] describere **eG**

[128] sphera] spheram **eG**

single thing, however, no matter how wretched and small, exceeds nothing to any infinite extent. Therefore when reason discovers an atom to be something [created] out of nothing, and it proceeds from this to the power of its producer, and, having measured it as a proportion of what is done to the means by which it is done, it will see that an atom could only emerge into being as a result of a power that is nothing less than infinite. Thus the emergence of an atom into being something out of nothing is a model of the infinite power of its producer.

Likewise, consideration by reason will discover that an atom is a body, and that within it there are three lines intersecting at right angles. With the foot of the compasses placed at this point, a sphere can be drawn within the atom, and inside the sphere an infinite number of circles and all the bodies of the sphere that can be drawn, and in the circles every shape that can be drawn in circles, and the number of these is infinite. Reason will see that any one of these innumerable shapes will support a demonstrable [understanding of] knowledge. And it will discover in the atom a description of infinite knowledge, not just as regards magnitudes, but also numbers. Since therefore reason will have found that [even] an atom made out of nothing requires infinite power, and sees in an atom a description of infinite knowledge, it might consider the very description of that same infinite knowledge by means of an atom as itself amounting to infinite knowledge. But infinite knowledge could not be described except by infinite wisdom. Reason will therefore see that the atom has been created by infinite power [only] by means of infinite wisdom.