

# The Metaphysics of Light in the Hexaemeral Literature

*From Philo of Alexandria to Ambrose of Milan*

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## ***Declaration***

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the Acknowledgements and specified in the text.

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It does not exceed the prescribed word limit.

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### Summary

This study investigates the concept of light in the early Jewish-Christian exegesis of the biblical creation narrative (*Gen. 1*, so-called 'hexaemeron'). The study argues that the early hexaemeral exegetes theorised light from a dual perspective, both physical and metaphysical. The physical exegesis explained how light emerges as the natural capacity or power of the first material element of the world: fire. The metaphysical exegesis aimed to capture that light is the first immanent form of creation. The argument evolves in three stages. The first chapter discusses contemporary objections to the possibility of an investigation into the nature of light in ancient sources. It argues for the coherence of an ancient 'physics of light,' properly speaking, that was also used by hexaemeral authors in the course of their scriptural exegesis. The second chapter addresses modern and ancient objections to the justifiability of a scientific reading of Scripture. It aims to show that in the eyes of early Christian exegetes the rational enquiry into the physicality of light was indispensable for a proper understanding of the *skopos* (intended meaning) of the biblical creation narrative. Once the historiographical and hermeneutical objections have been removed, the study proceeds with the investigation of the nature of hexaemeral light itself. The third chapter proposes a systematic reconstruction of the hexaemeral theory of light, as it would appear at the end of the fourth century, taking into account its historical development from Philo to Ambrose, with Origen, Basil and Nyssen as the main protagonists. It shows that, from a premodern perspective, the rational account of the nature of light leads through the study of the physical properties to the grasp of the *logos* or intelligible cause of light. The three chapters build gradually towards the insight that the *logos* of light is the first manifestation of the *logos* of God in creation.

The study offers a performative argument that, in the eyes of early hexaemeral exegetes, the metaphysics of creation is inherently incarnational: the contemplation of the light of the world reveals Christ as the creative *logos* of God at work. In this way, the study points towards a Christological answer to the much-debated question whether the talk of God as light (so-called 'metaphysics of light') is literal, metaphorical or anagogical. It thus provides the necessary background to deciphering the precise meaning of the Nicene formula 'light from light.'

*For Bartholomew*



“Which one can you name of the divinities in heaven as the author and cause of this, whose light makes our vision see best and visible things to be seen?” “Why, the one that you too and other people mean,” he said; “for your question evidently refers to the sun.” “Is not this, then, the relation of vision to that divinity?” “What?” “Neither vision itself nor its vehicle, which we call the eye, is identical with the sun.” “Why, no.” “But it is, I think, the most sun-like of all the instruments of sense.” “By far the most.” “And does it not receive the power which it possesses as an influx, as it were, dispensed from the sun?” “Certainly.” “Is it not also true that the sun is not vision, yet as being the cause thereof is beheld by vision itself?” “That is so,” he said. “This, then, you must understand that I meant by the offspring of the good...” (Plato *Republic* 508a-b tr. Shorey)

The eye is the lamp of the body. If, therefore, your eye is simple, your whole body will be full of light (*Mt.* 6:22)

For the one who sees has a kinship with that which is seen, and he must make himself the same as it if he is to attain the sight. For no eye has ever seen the sun without becoming sun-like, nor could a soul ever see Beauty without becoming beautiful. You must first actually become wholly god-like and wholly beautiful if you intend to see god and Beauty. (Plotinus *Enn.* 1.6.9 tr. Gerson)

Were not our eye another sun,  
How could we contemplate the light?  
Did God's own power not within us run,  
How could we share in God's delight?  
(Goethe *Zahme Xenien* III tr. Key-Fowden and Pilavachi)





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## ***Abbreviations***

Abbreviations follow the standard bibliographical practice, see e.g. Seland (2014), xii-xvi; Kalligas (2014), 681-706. Unusual abbreviations in this work are:

CC     *Contra Celsum*  
DP     *De principiis*



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## INTRODUCTION

The first corporeal form which some call corporeity is in my opinion light.  
(Grosseteste *De Luce* tr. Riedl)

### I. The 'metaphysics of light': *status quaestionis*

There are few terms that belong to the trade secrets of both philosophers and theologians. The 'metaphysics of light' is one of them. The term has been linked to Parmenides, Plato, Philo, Plotinus, Augustine, the Areopagite, Grosseteste, Bacon, Eckhart, Cuzanus and Ficino. And this is just the short list.<sup>1</sup> The theme of light has brought scientists, historians, philosophers and theologians to the same table and made them talk.<sup>2</sup> Light-symbolism has become a codeword for the Western 'mystical tradition,' however defined, giving it a sense of orientation, continuity and tradition.<sup>3</sup> Behind the popularity lies a revived interest in medieval light-speculation, climaxing in a fascination with Grosseteste's thought.<sup>4</sup> Every fascination, however, comes at a price. The references to the 'metaphysics of light' are currently so diverse and prolific that they have nurtured a devalued and exploded term. As David Lindberg once put it:

There has been much discussion of Grosseteste's 'metaphysics of light' (for which I prefer to substitute the expression 'philosophy of light,' since much of it has nothing to do with metaphysics), but this discussion has frequently suffered from a failure to make several indispensable distinctions among differing bodies of ideas. Within Grosseteste's philosophy of light, there are at least four distinct strands, each employing optical analogies and metaphors: (1) the epistemology of light, in which the process of acquiring knowledge of unchanging Platonic forms is considered analogous to corporeal vision through the eye; (2) the metaphysics or cosmogony of light, in which light is regarded as the first corporeal form and the material world as the product of the self-propagation of a primeval point of light; (3) the etiology or physics of light, according to which all causation in the material world operates on the analogy of the radiation of light; and (4) the theology of light, which employs light metaphors to elucidate theological truths.<sup>5</sup>

Lindberg's exposition shows why so many disciplines feel attracted to the 'metaphysics of light,' yet so little interdisciplinary consensus has been achieved, meanwhile, as to how to understand the term. In order to regain its focal meaning, we need to resist the tide, retrace our steps, and go back to where it all began. The great medievalist James McEvoy shows us the way:

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<sup>1</sup> See the overviews in Beierwaltes (1980a); Schültzinger (2003); Meyer-Schwelling (2006); Wallraff (2010), esp. 130-7.

<sup>2</sup> See the interdisciplinary contributions in O'Collins and Meyers (2012).

<sup>3</sup> Defining the contours and setting the tone, Louth (2007). Still indispensable is the monumental study of Goodenough (1969). See also, in cross-cultural perspective, the contributions in Kapstein (2004).

<sup>4</sup> For the medieval 'metaphysics of light' see Tavard (1950); McEvoy (1978); Hauskeller (2004); Schloeder (2012); Clarke and Bacchianti (2014). For the emphasis on Robert Grosseteste see McKeon (1948), 85-97, 156-74; Crombie (1953), 104-16, 128-31; Koyré (1956); McEvoy (1982); Lindberg (1986); Oliver (2004); Cunningham and Hocknull (2016).

<sup>5</sup> Lindberg (1976), 95.

The term 'metaphysics of light' was coined by Clemens Baeumker in 1916 and has been employed widely, though not uncontroversially, ever since. It designates a whole circle of themes, a current of philosophical and religious thought that runs right through European culture from ancient times down to the Renaissance.<sup>6</sup>

Baeumker introduced the term '*Lichtmetaphysik*' over a century ago in an epoch-making study on the anonymous *Liber de intelligentiis*, which he then attributed to the medieval thinker Witelo.<sup>7</sup> Baeumker spoke of 'metaphysics of light' to denote, very generally, the identification of the intelligible world with light. And since God was theorised in the *De intelligentiis* as the first principle of every intelligent nature, and every intelligent nature was identified with light, the 'metaphysics of light' ultimately denoted the identification of God, *qua* ontological foundation of reality, with some kind of primordial light. In specifying what that kind of light might be, Baeumker distinguished three ontological models and respective modes of language:<sup>8</sup>

- An immanentist model, according to which the divine is light *properly* speaking, as part of a physicalist metaphysical universe, in which God is identified with cosmic light or fire. The examples that Baeumker used include the Brahman of the Upanishads, the Heraclitean/Stoic cosmic fire, Manichean light, and, more generally, the astral deities of the Hellenistic cosmic religion.
- A transcendental model, according to which the divine is 'light' *metaphorically* speaking. 'Light' functions here merely as a *façon de parler*, one of many possible ways of speaking about God, who by his very nature exceeds the limits of human thought and language. Baeumker's examples included Plato's celebrated light-images from the central books of the *Republic*, the so-called 'sun simile' (VI 507a-509c) and the 'allegory of the cave' (VII 514a-520d).
- A mixed model (of combined transcendence and immanence), building on a metaphysics of mediation or participation. The participatory metaphysics of this model entailed a unified and continuous notion of 'light,' of which sensible light and intelligible light were the two extremes. Like the physicalist (first) model, the divine is here, too, light *properly* speaking. But unlike the physicalist model, divine light is now the transcendent intelligible archetype, of which every material-physical light is the sensible copy. Baeumker saw the beginnings of this model in Philo of Alexandria and its full articulation in later Platonism, especially in the works of Plotinus and Proclus, before it acquired its highest peak in medieval scholastic philosophy, most notably in the *De intelligentiis*.

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<sup>6</sup> McEvoy (2000), 87.

<sup>7</sup> See Baeumker (1908). Baeumker later defended the view that the author was another 'metaphysician of light,' Adam Pulchrae Mulieris, a generation older than Witelo, see Baeumker (1924). The question of authorship is still open.

<sup>8</sup> See for the following Baeumker (1908), 357-433, esp. 380 for the tripartite classification. The criteria of 'immanence,' 'transcendence' and 'mediation-participation' are mine. But I have only provided the categories for what Baeumker already described in words.



The metaphysical universe of Baeumker's third model was, admittedly, 'Neoplatonic' and its light-language 'analogical.' The kind of analogy that Baeumker had in mind was the Scholastic variant of the 'analogy of attribution' (*per prius et posterius*).<sup>9</sup> In this view, 'divine light' was not a mere figure of speech but light properly speaking. The intelligible world was truly light (prior or original sense), while the light of the senses (like the light of the sun, the moon etc.) could only be called 'light' in virtue of a relation of participation to an intelligible archetype (posterior or derivative sense). As regards Christian thinkers, Baeumker's position was ambivalent, making three incongruent claims: First, the authors of the New Testament and early Christian thinkers spoke of God as light only metaphorically. Secondly, post-Nicene theologians deviated from the original tradition by introducing the 'Neoplatonic' participatory metaphysics and its corresponding analogical language to denote the emanation of divine light to the world. As regards the transcendent divine essence and the persons of the Trinity, however, post-Nicene theologians retained the originally 'Platonic' metaphorical light-language of the original tradition of the early Church. Implicit in this scheme was the distinction between 'theology' and 'economy' or *ad intra* and *ad extra* of God, to which Baeumker correlated the metaphorical and the analogical use of light-language respectively. The main protagonists of this binary use of language were, for Baeumker, Gregory Nazianzen and Dionysius the Areopagite in the Greek patristic tradition and Augustine and his school in the Latin tradition. Thirdly, Aquinas criticised the Augustinian tradition for being closer to Neoplatonism than Scripture, since the scriptural language of God as 'light' (and of Christ as 'true light') had to be, under Thomas' Aristotelian premises, metaphorical. Baeumker also warned the reader that the distinction between the three models can be hard to make, while the classification of a particular author or text in this or that model can easily become contentious.

Baeumker's thesis would have probably remained a minor incident in the history of Western scholarship, had it not touched upon a sensitive chord. Throughout the twentieth century, continental scholars debated explicitly or implicitly, but always passionately and inconclusively, about Baeumker's classification and model attribution. Two examples amply show how a whole century of light-dialectics led to the current standstill. Giles Wetter was an early defendant of the physicalist model, which he used for the interpretation of light-imagery in Hellenistic religious thought, especially the mystery cults.<sup>10</sup> The response came almost half a century later from Franz-Norbert Klein, who, in a special monograph, argued for the contrary position, based on the writings of Philo of Alexandria and the Hermetic Corpus. Yet, Klein remained enigmatic as regards his own interpretation of Philo: on the one hand, he observed the compresence of Baeumker's transcendental and participatory ontological models in the Philonic corpus; on the other hand, he insisted that, in spite of the participatory metaphysics and in view of divine transcendence, the Philonic language of God as light had to be metaphorical.<sup>11</sup> Another famous episode in the hundred years' war over the pre-modern light-hermeneutics was the debate between Werner Beierwaltes and Rein Ferwerda, this time with Plotinus as the apple of discord. Beierwaltes dedicated his life's work to the refinement and further development of Baeumker's thesis, becoming the leading expounder

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<sup>9</sup> On the medieval theories of analogy see Ashworth (2017).

<sup>10</sup> See Wetter (1915).

<sup>11</sup> See Klein (1962), 78 (two ontological models); 72, 211-2 (metaphorical language).

of the 'metaphysics of light' in the second half of the twentieth century.<sup>12</sup> For Beierwaltes it was only the participatory model that gave rise to a proper light-metaphysics (*Lichtmetaphysik*), while the transcendental model allowed merely the generation of light-metaphors (*Lichtmetaphorik*). From his doctoral thesis to his erudite studies on Plotinus and Proclus, Beierwaltes defended the participatory metaphysics of light as the distinctive characteristic of the Platonic tradition: true being was intelligible being and intelligible being was light properly speaking, while physical light was so only in virtue of its participation to its intelligible archetype. The names belonging to this tradition make up a long list, including Pythagoras and Parmenides as forerunners; Plato as the founder; and two lines of succession, through which the metaphysics of light came to flourish: Plotinus and Proclus on the one hand, Philo and the Church Fathers, especially Augustine and Dionysius the Areopagite, on the other.<sup>13</sup> Beierwaltes' interpretation of Plotinian light-imagery caused the emphatic reaction of Ferwerda, who argued that the dualistic premises of Platonic orthodoxy, of which Plotinus was a true disciple, necessitated a radical gap between the intelligible and the sensible realms. Such discontinuity precluded the possibility of any analogical language of light. Consequently, Plotinus' use of light-imagery in speaking about the higher realities was purely pedagogical, hence metaphorical, while Beierwaltes' participatory light-metaphysics was an anachronistic eisegesis of the medieval theory of analogy, inspired by Baeumker and projected back onto ancient sources.<sup>14</sup> Ferwerda's argument may have shaken (though not destroyed) the credibility of Beierwaltes' thesis as regards Plotinian scholarship.<sup>15</sup> But it only helped reinforce Beierwaltes' interpretation as regards the Augustinian tradition throughout the Middle Ages. Anyone interested in the analogical talk of God as light (and an alternative to Thomist *Lichtmetaphorik*) had only to look here for a safe heaven.<sup>16</sup> Hence the fascination, in English scholarship, with Grosseteste under the borrowed label of the 'metaphysics of light.'

Clearly, there is something elusive in a debate that lasts over a century without reaching a conclusive result. A careful study of the major protagonists reveals a subtle but crucial detail. The recurring question in the aforementioned literature has not been the interpretation of Philo, Plotinus, Augustine, Dionysius or Grosseteste as such. The real issue has been how these thinkers interpreted another text: Plato's 'sun-simile' (together with the adjacent images of the 'divided line' and the 'cave'). The real debate, then, has been about the history of interpretation of the Platonic light-language. If we now go back to the original source, it is easy to see that the Platonic text is itself responsible for its ambiguous reception history. In his speech to Glaucón, Socrates introduces the sun as an *analogon* of the Good, in the sense that 'whatever the Good is in the intelligible realm, in relation to the intellect and intelligible

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<sup>12</sup> For the development of Beierwaltes' thought on light-metaphysics see Beierwaltes (1957); (1961); (1965); (1976); (1980a); (1980b).

<sup>13</sup> For the reception history see Beierwaltes (1980a), 282-5.

<sup>14</sup> See Ferwerda (1965), 2-7, 46-9, 57-61.

<sup>15</sup> See Emilsson (2007), 8-9: light as one of many 'emanative metaphors.' But cf. Lloyd (1990), 100: light is not a 'mere analogy or metaphor,' but one of many 'examples of the physical model of emanation.'

<sup>16</sup> It should be noted however that Thomas' *considered* view is much more nuanced than occasionally presented, implying a distinction between 'sensible light,' which is used metaphorically with regards to God (like the 'sun-simile'), and 'intelligible light,' which is predicated properly with regards to intelligible beings and analogically with regards to God, see Whidden (2014), 71-86. One may remark, with McEvoy (1978), 141, that Thomas recovered, in the end, much of the metaphysics of light of the Platonist tradition 'in categories that were different, largely original and less ambiguous than those he rejected.'

things, the same is the sun in the visible realm, in relation to sight and visible things' (508b13-c2). Socrates then goes on to explain the analogy in terms of a simile (*hōsper – houtōi* 509a1-5) but he also says that the sun is the image (*eikona*) of the Good (509a9), exhibiting a relation of similarity (*homoiotēta*) to it (509c6). The perennial question in Western light-hermeneutics has been, precisely, the meaning of the sun as an *analogon* of the Good. Yet, the question has not been so much historically as hermeneutically phrased. The focus has always been on the reader's approach, not Plato's. If one were to reflect on the sun-simile, for example, through the lens of Aristotle's theory of metaphor – the theory of metaphor that became classical through Quintilian and Cicero and which also underlies Aquinas' thought – one would easily conclude that Plato's light-imagery (or any other light-imagery for that matter) is a clear-cut case of figurative speech.<sup>17</sup> If one were to reflect, however, on the ontological role of the 'image' (*eikōn*) in the context of participatory Platonic metaphysics, i.e. from within the original context of the sun-simile in the *Republic*, one would easily conclude that the sun is the sensible copy of an intelligible archetype, which in turn stands in a certain causal relation to the Good. Even though Plato's light-imagery is, strictly speaking, a simile, the ground of the simile (the sun) is ontologically dependent on the semantic target that it aims to explain (the Good): in Plato's metaphysical universe the sun does not merely illustrate the function of the Good. The sun is what it is, irrespectively of any simile, *because* of the Good. As G.E.R. Lloyd puts it in his monumental study on *Polarity and Analogy*, not all types of Platonic 'metaphors' are empty figures of speech.<sup>18</sup> The 'sun-simile' contains an analogical argument as 'an important means not merely of instructing the pupil, but also of discovering and intuiting the truth.'<sup>19</sup> It is one of those 'true and significant analogies,' which are 'not a mere coincidence, but rather, it seems, the result of a sort of divine guidance.'<sup>20</sup> With these thoughts in mind, and after a century of debates, it is possible to draw an irenic conclusion. The 'metaphysics of light' is a term with a precise reference (the talk of the divine as 'light') and an elusive meaning. Its elusiveness is the result of the peculiar mixture of metaphorical language with participatory metaphysics in the central books of Plato's *Republic*. Much of Western light-imagery can be traced back to this text.<sup>21</sup> To this extent, the quest for the 'metaphysics of light' is the quest for the role and meaning of Platonic metaphysics in the Western intellectual tradition.

## II. What this study aims to do

The aim of this study is not to rehearse the history of Western thought, nor the history of Platonic metaphysics and its underlying light-imagery; neither does this study aim to explore the reception history of Plato's 'sun-simile'; nor to revisit the question of metaphor and analogy. This study has the modest aspiration of revisiting only a tiny part of the intellectual

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<sup>17</sup> On the classical theory of metaphor see Aristotle *Poetics* 21; *Rhetoric* III.2-4; Cicero *De oratore* II.45 (261-2); Quintilian *Institutio oratoria* VIII.6-IX.1. See further Soskice (1985), 3-10; Boys-Stones (2003); Hills (2017). On Aristotle's own metaphorical interpretation of the Platonic light-imagery see *De anima* III.5 (430a14-7): the active intellect is 'like the light' (*hoion to phōs*).

<sup>18</sup> See Lloyd (1966), 226.

<sup>19</sup> Lloyd (1966), 402.

<sup>20</sup> Lloyd (1966), 402.

<sup>21</sup> See McKeon (1948), 157; Lindberg (1976), 95.

tradition that has been classified under this or that model of the ‘metaphysics of light,’ namely the Jewish-Christian metaphysical tradition of the early Church, and then again only one episode in the context of this tradition, which is, as we know today, extremely rich and diverse in its expressions. The episode I have in mind is highlighted with the names of Philo of Alexandria and Ambrose of Milan at its two ends, and has Origen, Basil of Caesarea and Gregory of Nyssa as its main protagonists. There are a few significant reasons for this choice. As we already saw, Philo is the point of contention between Baeumker or Beierwaltes, who place him at the head of the participatory metaphysics of later Platonism and its analogical light-language, and Klein, who pushes the point that metaphorical language is the only one adequate to express absolute divine transcendence. At the same time, Philo is at the head of a metaphysical tradition, which, through the catechetical school of Alexandria, reached down to Origen and, through an Origenian line of transmission via Gregory Thaumaturgus and Macrina the Older, became a major source of inspiration for the Cappadocian school of thought.<sup>22</sup> Philo, Origen and Basil were in turn the great influences behind Ambrose, who initiated Augustine into the deeper meaning of Scripture.<sup>23</sup> Similarly, in the East, the unknown Syrian author writing at the turn of the fifth and sixth centuries under the literary name of Dionysius the Areopagite is highly indebted to the Alexandrian and the Cappadocian schools for his doctrine of illumination.<sup>24</sup> But it is the short treatise on *Mystical Theology*, with its celebrated imagery of ‘divine darkness,’ that has contributed most to the author’s legacy as the mystical theologian *par excellence*. The treatise is based on the theme of Moses’ mystical ascent, which the author could not have developed in this way were he not deeply acquainted with the works of Philo and Nyssen on the *Life of Moses*.<sup>25</sup> This is, then, the justification for my choice of authors: in drawing a line of succession from Philo to Ambrose, I aim to investigate the formative period of the Christian metaphysics of light, before the two great stars of late antique light-hermeneutics, Augustine and Dionysius, entered the scene. My hope is that, in highlighting the text, context and subtext of the metaphysics of light of the early Church, the Augustinian and Dionysian scholar will be better situated in their work. It would be highly unjust, however, to regard my sources as purely instrumental to the interpretation of the writings of their students. The deeper hope of this study is to show something of the intellectual richness, argumentative prowess and hermeneutical finesse of some of the most remarkable thinkers of late antiquity. So much so that my protagonists, namely Origen, Basil and Nyssen, have been, strikingly, entirely neglected by the previous discussion on the metaphysics of light. In bringing them into focus, I aim to fill in a gap in current scholarship. In doing so, some of what we thought we knew about late antique light-metaphysics might shine under a different light. This is also important for the history of Christian doctrine. My major protagonists belong to the chorus of early Christian thinkers that shaped what has been called ‘pro-Nicene’ theology.<sup>26</sup> Thus, in the subtext of this study is, always implicit but never out of sight, that history of interpretation of the Nicene formula ‘light from light.’

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<sup>22</sup> For the Philonic legacy of the catechetical school see van den Hoek (1997). For the Alexandrian tradition as part of the intellectual inheritance of Basil’s and Nyssen’s family see Rousseau (1994), 11-4; Silvas (2008).

<sup>23</sup> On Ambrose’s debt to Philo, Origen and Basil for his scriptural exegesis see Ramsey (1997), 67. As regards his hexaemeral homilies see Henke (2000), 17-29.

<sup>24</sup> See Louth (1989), 40.

<sup>25</sup> See Louth (1989), 100-1.

<sup>26</sup> See Ayres (2004), 6, 167-8, 236-40.

### III. Method, working hypothesis and contribution to knowledge

In his review of Klein's monograph, the French classicist Pierre Boyancé remarked that Klein had completely neglected to take into account the physical theories that supported and further explained Philo's light-metaphors and light-metaphysics.<sup>27</sup> Take, as an example, the (ontologically) weaker case of a purely metaphorical use of language. Boyancé basically argued that, according to the classical metaphor theory, the structure of a simile consists of the transfer of meaning (i.e. of a semantic property) from a source domain to a target domain, establishing a relation of similarity between the two. In the case of light-metaphors, the source domain is physical light and the target domain is an intelligible agent or object (like the divine intellect or the intelligible world). In order to understand the meaning of an ancient source predicating 'light' to God, we need to know which properties of light the author had in mind in this particular context. This, in turn, requires an investigation into the physics of light that justified these properties. Boyancé rightly complained that Klein never conducted such an investigation. His was a serious accusation. Even if it is true that the Philonic use of light-imagery is entirely metaphorical, as Klein argued, Klein's research gives us no clue whatsoever what the *meaning* of Philo's light-language is. Boyancé's complaint can be generalised. As far as I know, the debate on the metaphysics of light never touched upon the physical theories underlying the language of God as light. This lack of interest in the physics of light is even more astonishing as regards the Nicene language of light and its context. Assume the ontologically weaker scenario of a metaphorical use of language. We still need to ground the meaning of the Nicene formula 'light from light.' How does light generate from light in the physical world? What are the *physical* properties of light that are here *theologically* relevant? To the best of my knowledge, there are no studies that help us understand the physics of light that pre- and post-Nicene thinkers employed in drafting their theological light-language.<sup>28</sup> Why assume that these premodern thinkers understood light in our post-Einsteinian way? Why assume that they all used one and the same theory of light? Why assume that the Nicene language of light is today as transparent, clear and coherent as it was back in the fourth century?

This study begins with the working hypothesis that the premodern language of light is not self-explanatory. For this reason, the study sets out to investigate the early Christian concept of *natural light*, claiming that this concept directly shaped the referential meaning and semantic context of the theological language of light of the early Church. To achieve its goal, this study remains intentionally agnostic as regards the question of language. Its aim is to shift

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<sup>27</sup> See Boyancé (1963).

<sup>28</sup> The lack of interest in the physics of light is most evident in the camp of '*Lichtmetaphorik*,' see for example the studies of Wallraff (2001); Kariatlis (2013); McConnell (2014). Studies who consider the light-imagery to be more than a mere metaphor investigate further the ground of the analogical reasoning from light, see the much neglected but still best study available on the subject by Pelikan (1962), 21-36 ('metaphor' in the sense of a platonic *paradeigma*); 39-51 (the role of the doctrine of creation in the shaping of light-language); 55-72 (history and development of the Nicene light-language). See further O'Collins (2012), following Pelikan, and Tanner (2012). Even these studies, however, forgo a systematic investigation of the physics of light that grounded the pre- and post-Nicene light-language. I know only of two studies that attempt a close reading of the theological light-language together with the physics of light that grounds it, see the monograph of Whidden (2014), 47-67, which, however, focuses solely on Aquinas; and the paper of Marinescu (2013), which, however, remains at a superficial level (see e.g. p. 87 confusing the nature of the medium with the nature of light).

focus from the *use* to the *meaning* of the light-language in the sources. Thus, the purpose of this study is to investigate the *meaning of the early Christian metaphysics of light*. Yet that is not as straightforward as it seems.

The major obstacle that this study had to overcome was the absence of a systematic study on the ancient physics of light. The reasons why this gap exists are thoroughly explored in the *first chapter*. I there discuss the current trend of approaching ancient theories of light from a purely ‘ocularist’ perspective, as parts of ancient theories of vision. I show why this is not the only way to read the texts and I argue that it is actually the wrong way of reading Jewish-Christian sources. Thus, the first chapter of this study is devoted to the task of rediscovering the path that leads to the ancient physics of light – a path that was firmly blocked by modern historiography. The second challenge that this study had to overcome was to show that this path was theologically relevant. It is one thing to show that there exists an ancient physics of light; it is another thing to show that Jewish-Christian thinkers developed their own version thereof; and it is altogether another thing to argue that the Jewish-Christian physics of light is theologically significant. For this reason, in the *second chapter* of this study I discuss various objections raised against the compatibility of the ‘logic’ of Scripture with scientific rationalism. This chapter argues that binary distinctions like ‘Scripture vs. science,’ ‘faith vs. reason’ etc., stem from anachronistic or uncharitable readings of the sources. The connection between Scripture and pre-modern science is found in the early Church doctrine of the *logos*. It is through the *logos*-doctrine that the physics of light acquires a genuinely hermeneutical, hence theological, import. With the above caveats and contentions, the *third chapter* embarks on the investigation of the early Jewish-Christian physics of light. I here collect all the clues given in the sources, I discuss them from the backdrop of the major scientific theories of light available at the time, and I reconstruct the outlines of a systematic theory of light as it would appear roughly in the timeframe between the Council in Nicaea (325) and the Council of Constantinople (381). My reconstruction shows that, irrespective of the question of language, the Christian physics of light entailed specific ontological commitments, i.e. a proper metaphysics of light. I conclude by showing how these ontological commitments are Christologically loaded, advancing our understanding of the early Christian theology of light.

The basic source for the physics of light of the early Church is the so-called ‘hexaemeral’ tradition, i.e. the collection of commentaries, homilies and special treatises concerned with the exegesis of the biblical creation narrative of *Genesis* 1.<sup>29</sup> The earliest extant commentary is Philo’s treatise *De opificio*, though Philo was certainly not the first one to produce a hexaemeral exegesis.<sup>30</sup> His work, however, has exercised tremendous influence (directly or indirectly) over the subsequent tradition, giving rise to a body of literature that exhibits a certain structural and thematic unity.<sup>31</sup> It is only in the latter sense that this study speaks,

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<sup>29</sup> For a heuristic definition of the hexaemeral literature see Robbins (1912), 1. For a list of the hexaemeral sources see Congar (1964), 215-22. The best overview of the field is given by van Winden (1988). The most comprehensive study is that of Köckert (2009). For the hexaemeral exegesis in cross-cultural respect see the collection of papers in Centre d’études des religions du livre (1973). For the influence of the hexaemeral literature in the history of art see Zahlten (1979).

<sup>30</sup> On the literary context of Philo’s hexaemeral exegesis see Tobin (1983); Runia (2001), 19-20, 30-2; Matusova (2010); and the collection of papers in Seland (2014).

<sup>31</sup> On the Philonic legacy in the Patristic tradition see Runia (1993) and (2014).

somewhat indiscriminately, of a 'Jewish-Christian' hexaemeral tradition, in order to stress the lines of continuity behind the indisputable exegetical variety.<sup>32</sup> As will become clear, it is the hermeneutical interplay of diversity and continuity that yields the particular theological import of the hexaemeral physics of light. To retrieve this hermeneutical interplay, this study engages in a close reading of the hexaemeral texts. My effort has been to use existing and easily accessible translations, even though in many cases they had to be (more or less) modified for the sake of a more accurate reading. In a few cases, an entirely new translation had to be produced.

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<sup>32</sup> On the exegetical unity-in-diversity of the hexaemeral tradition see the thematic overviews of Wallace-Hadrill (1968); Bouteneff (2008); Bright (2008); Louth (2009); Allert (2018). In systematic perspective see Young (2013), 44-91. These studies document a gradual shift in patristic scholarship towards a greater appreciation of the scientific and philosophical sensitivity of the hexaemeral authors.





## CHAPTER 1

### “From Sight to Light”: A Hexaemeral Guide for the Perplexed

The angels were made before heaven. Heaven and everything below were made afterwards. The angels, then, stood by at creation. Heaven was fixed, the angels were praising. Because they did not see themselves being made, they marvelled as heaven was made. They were seeing the sun being kindled, the moon bringing light, the stars being made, and they were astonished. For God tells Job: “When I made the stars, all of my angels sang my praises” [Job 38:7]. (*Ad Gen.* 1:1 from the *Catena*, my translation)

This study begins with the working hypothesis that the ancient physics of light holds the key to deciphering the theological language of light. A closer acquaintance with the history of science, however, reveals that there is a certain naïveté in taking this hypothesis as a starting point for discussion. The hypothesis takes for granted that there is such a thing as an ancient ‘physics of light.’ Yet, this very assumption is extremely contentious in contemporary history of science. According to one school of thought, light was the proper object of enquiry in pre-modern physics. Ancient theories of light were, therefore, early intimations of modern optics in the sense of a proper ‘physics of light.’ According to another school of thought, the object of enquiry of pre-modern optics was sight, not light. This approach understands the passage from pre-modern to modern optics as the passage ‘from sight to light’ in the sense of a paradigm shift. The paradigm shift does not allow us to speak of a pre-modern ‘physics of light’ in the way that we understand the term today. What is at stake is the possibility of a premodern discourse on the nature of light. Simply put, the question is whether the ancient sources theorize light as an autonomous physical agent in the world. The question becomes particularly pressing once we realize that the early Christian theology of light is deeply rooted in biblical hermeneutics.<sup>1</sup> If we follow the first approach, it is possible to speak of a premodern ‘physics of light’ and hence enquire about its biblical version, starting with the interpretation of *Gen.* 1:3. If we follow the second approach, there is no ancient theory of light independent of a theory of vision. This complicates things from a biblical perspective since the biblical text does not mention any spectators of the first light of creation other than God. But should we understand *Gen.* 1:5 as implying that God ‘saw the light’ in a physical sense?

This chapter aims to address the preliminary question whether it is possible to speak of a genuine *physics of light* in hexaemeral literature. This invites us to link the hexaemeral sources with contemporary questions raised in the history of science, more specifically in the history of optics as the scientific discipline interested in the study of light. In what follows, I shall *dialectically* argue that hexaemeral light is part of the late antique physics of light. My argument is going to be dialectical in the sense that I am not going to refute the optical

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<sup>1</sup> For a thorough discussion of the biblical underpinnings of the Nicene theology of light see Pelikan (1962).

paradigm as irrelevant to the sources. Instead, I am going to show that it has been mistakenly interpreted as subordinating light to sight when, in fact, it is the other way around. In pursuing my argument, I shall situate ancient theories of light within the framework of hexaemeral hermeneutics. I aim to show that the hexaemeral physics of light as part of a comprehensive theological project does not exhaust itself with the study of the physical world. Much more than that, it aims to guide the reader of the biblical creation narrative from the phenomenal world to the world of intelligible causes.

## I. The intelligibility of hexaemeral light

Scripture begins with a thought experiment. The opening chapter of the Book of *Genesis* invites the reader to go back to the beginning of time (*en archē*) and visualize the universe in its early, still ‘unformed’ (*akataskeuastos*) state.<sup>2</sup> The story narrates the formation of the universe in several cosmic periods: ‘six days,’ *hexi hēmerai*, whence ‘hexaemeron,’ denoting synecdochically – together with the seventh day of the Sabbath, to which later the Christian eighth day of the Lord was added – the whole of God’s creative work. ‘Heaven and earth’ were created first, but the earth was ‘invisible’ (*aoratos*) since there was no light. Then a speech act happened, a luminous epiphany of a divine command: ‘And God said: “Let there be light”; and there was light.’ The narrative continues with the reader visualizing God seeing the light, acknowledging that it was good, and dividing light from darkness. Thereupon the measurement of time appeared, ‘day’ and ‘night,’ revealing a pattern of regularity of succession, ‘evening’ and ‘morning.’ That was ‘day one’ (*hēmera mia*), the first stage of the new-born universe (*Gen.* 1:1-5).

There are several hints in the biblical account of the cosmogenesis that there is more to the narrative than first meets the eye. The perspective is clearly geocentric, as the measurement of time in days and nights betrays – a bizarre choice from a theocentric perspective. And there are signs that the narrative might be more sophisticated than it initially appears. If measured time begins with the first divine speech act – *fiat lux* – that set creation in motion, what is the state and nature of the pristine cosmic elements: ‘heaven,’ ‘earth,’ ‘spirit’ and ‘waters’? Which of our cosmological categories befits best the biblical notion of the ‘abyss’? Why does the earth subsist in the beginning alone and ‘unformed,’ while all the stars and planets were created much later and fully adorned? And why is it that only the earth is invisible and not both heaven *and* earth? The biblical narrative begins with the cosmogenesis, and a storm of thoughts blows through the mind of the contemporary reader. In this confusing state, only one narrative element sounds familiar and recognizable, an element with which even a lay newcomer to this strange new biblical world can relate: ‘light’ – pure natural, physical light. Yet again, the sense of familiarity vanishes once we read more closely. If ‘heaven and earth,’ the ‘spirit,’ the ‘waters’ and the ‘abyss’ do not match, *prima vista*, our known cosmological categories, why should ‘light’? If there was nothing ‘out there,’ apart from some strange dark cosmic ‘stuff’ – viz. the invisible and unformed ‘earth’ etc. – where did light come from? Moreover, we are told, ‘God saw the light that it was good’ (*kai eiden ho theos to phōs hoti*

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<sup>2</sup> The analysis follows the Septuagint text, which was the primary source of the hexaemeral authors. All biblical citations are therefore from the Greek text.

*kalon*, Gen. 1:4).<sup>3</sup> Surely, this is a figure of speech unless God has a body and sense organs and can see. If God's vision is meant metaphorically, why should the object of this vision – viz. light – be understood literally? Or perhaps God's vision of light is not a metaphor and God does indeed have some kind of strange visual apparatus. Why should then this light that God saw be less strange than the eye that contemplated it? Why assume that an awkward, if literal, divine vision has as its subject matter a less awkward, literal, light? Just a little bit of reflection on one of the most widely cited biblical commonplaces – *fiat lux* – and neither the *fiat* nor the *lux* is as innocuous as a naïve cosmological narrative would suggest. No wonder then that the interpretation of the first chapter of *Genesis*, especially the opening verses, has been hugely debated since antiquity.<sup>4</sup> Anything but perspicuous itself, the first light is paradoxically meant to illuminate everything else. If so, God works in mysterious ways indeed. Or perhaps the light of *Genesis* is simply what it says it is, namely physical light, and it does what it says it does, namely to illuminate, but we do not yet have the right eyes to see. If one thing is clear, the question of the nature of this 'light' cannot be settled by the biblical text alone. It also requires an act of interpretative decision. Basil, who has been extremely influential in the patristic tradition, describes, colourfully, in his hexaemeral homilies the interpretative crux of the biblical exegete:

I know the laws of allegory although I did not invent them of myself, but have met them in the works of others. Those who do not admit the common meaning of the Scriptures say that water is not water, but some other nature, and they explain a plant and a fish according to their opinion. They describe also the production of reptiles and wild animals, changing it according to their own notions, just like the dream interpreters, who interpret for their own ends the appearances seen in their dreams. When I hear "grass," I think of grass, and in the same manner I understand everything as it is said, a plant, a fish, a wild animal, and an ox." [...] Shall I rather give glory to Him who has not kept our mind occupied with vanities but has ordained that all things be written for the edification and guidance of our souls? This is a thing of which they seem to me have been unaware, who have attempted by false arguments and allegorical interpretations to bestow on the Scriptures a dignity of their own imagining. But, theirs is the attitude of one who considers himself wiser than the revelations of the Spirit and introduces his own ideas in pretence of an explanation. Therefore, let it be understood as it has been written. (*Hex.* IX.1 GCS 146.11-147.23 tr. Way)

It is clear from Basil's militant report that the literal reading of the first chapter of *Genesis* was not at all evident to ancient readers – just as it ought not to be to the reflective contemporary reader.<sup>5</sup> Basil opts in this context for a literal reading.<sup>6</sup> 'Grass' is grass, he says in the ninth homily, and 'fish' is fish. So, too, 'water' is water and 'light' is light, i.e. pure natural, physical light, as he makes clear in his second (II.4) and third (III.6, 9) homilies. Many Church Fathers, like most biblical scholars today, made the same interpretative choice as Basil and understood

<sup>3</sup> The Septuagint text follows closely the Hebrew text, in which 'the light' (*ha-or*) is the object of the verb 'saw' (*wa-yar*), see Alexandre (1988), 92. The syntactical order is also preserved in the Vulgata: *Et vidit Deus lucem quod esset bona*. But it is usually concealed in modern translations: 'And God saw that the light was good.'

<sup>4</sup> In understanding these debates, we owe a lot to the work of Jacobus van Winden, see the collection of essays in den Boeft and Runia (1997), 1-157.

<sup>5</sup> For a very good discussion of the different interpretative approaches to *Genesis* 1–3 see Bouteneff (2008). On the intelligibility and inner dynamics of the allegorical approach see the stimulating study of Dawson (1992).

<sup>6</sup> On Basil's *ambivalent* stance towards the allegorical interpretation of *Genesis* and the context of its rejection in the hexaemeral homilies see Lim (1990); Hildebrand (2007), 122-39; Bouteneff (2008), 126-31, 171-2; Köckert (2009), 384-91. As Drecoll (2017), 97-104, has convincingly argued, however, Basil's rejection of allegory should not be misunderstood as a rejection of the deeper sense of Scripture. On the contrary, Basil explored the hidden sense of the hexaemeral narrative by a close reading of the biblical text.

'light' literally.<sup>7</sup> Given the aforementioned *aporiai* that the text generates, the literal interpretation is not the easiest route to take. Augustine initially thought it an impossible task. He then tried and, admittedly, failed. Later, he tried again, and it took him fifteen years to come up with an interpretation that would hardly comply with modern standards of literal exegesis. It remained an attempt *ad literam*, 'according to the letter.'<sup>8</sup> Nevertheless, the literal interpretation is perhaps the safest way *into* the biblical text. In the end, if 'light' is not light, there is little left to make sense at all of the opening verses of the Bible.

This study too adopts as its starting point Basil's basic assumption that the reference of the biblical *or-phōs-lux* of *Gen.* 1:3–5 is *physical* light. The question is: *whose* physical light? Clearly, for Basil *phōs* is what *Basil* took physical light to be. Similarly, for us *phōs* is *our* notion of physical light. I would here like to be able to add effortlessly that Basil's concept of light is the same as ours. But that might not be so easy as it sounds after sixteen centuries of scientific progress. Surely, there have been significant changes in how scientists theorize the physical world – recall only the change caused by the use of the telescope – and the mere logical assertion that 'light' is light will not do. 'Hesperus' is Hesperus (the 'evening star') and 'Phosphorus' is Phosphorus (the 'morning star'). As we know today, the evening star *is* the morning star, namely the planet Venus. But people were not always aware that the two names have the same reference. At the time of Basil, the memory was still alive of the evening and the morning star being considered as different heavenly bodies.<sup>9</sup> Or, to take another trivial example, 'atoms' are atoms. But 'atoms' in ancient physics occupied the place of elementary particles, while in modern physics the place of elementary particles is occupied by subatomic structures ('fermions' and 'bosons'). The same concept ('atom') has lost its ancient reference (elementary particle). Why should we assume otherwise in the case of light? The examples show that even ostensible definitions do not work in the history of science since the relation between sense and reference may change over time. It is not to be excluded that Moses or Basil, or any premodern reader of Scripture for that matter, pointed at something entirely or partially different than we do today when they thought of the word 'light.' That is the reason why my first task is to lay out the assumptions under which premodern biblical exegetes conceptualised physical light. Whether 'light' has the same reference in ancient and modern physics is in fact a disputed question. In what follows, I will situate hexaemeral literature in the context of this controversy and draw the necessary conclusions for the hexaemeral theories of light.

## II. The oculocentric thesis

The question of the nature of light occupies the central stage in contemporary history of science. Significant milestones of twentieth-century historiography have been the ground-

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<sup>7</sup> See the evidence in Alexandre (1988), 91.

<sup>8</sup> For Augustine's various attempts at a hexaemeral exegesis and the different levels of interpretation involved see Chaffey (2011), esp. 89-91.

<sup>9</sup> See Achilles *Intr. Arat.* 17 Di Maria (= 43 Maass); *Ibycus* fr. 331 Loeb/P.M.G.(= 42,43 Bergk), according to a scholiast on Basil, *In Genesim (Anecd. Oxon.* vol. III 413 Cramer). Cf. also Euripides, *Melanippe* fr. 486 Nauck, quoted by Aristotle *EN* 1129b (slightly altered) and, through a different source, by Plotinus *Enn.* I.6.4.12.

breaking, but contested, work of Vasco Ronchi, *Storia della luce*,<sup>10</sup> and David Lindberg's authoritative work on *Theories of Vision from Al-Kindi to Kepler*.<sup>11</sup> They both established the contours of the field that is now recognized as 'history of optics.' Both works bequeathed to younger generations of scholars a hidden tension: on the one hand, they recognized the centrality of the question of light; on the other hand, they skewed the question by shifting focus from light to sight. It is still instructive to remember how this shift occurred.

Ronchi began his historical survey with a theologian's approach: the biblical account of the creation of light. Ronchi did not make any reference to the great Jewish-Christian hexaemeral tradition. But his remarks sound like a modern version of a hexaemeral commentary on primordial light. The first verses of *Genesis* entail, for Ronchi, 'a theory on the nature of light,' according to which light has 'an existence of its own, independent of its source and of its receiver.'<sup>12</sup> Since the hexaemeral tradition remained elusive, if not unknown, to Ronchi he did not have the necessary material to pursue the *Genesis* lead further. In trying to unfold the story of light, he was left only with ancient Greek theories of light to work with. If Ronchi had paused right there, the purpose of my study would have been very simple: to compare Ronchi's account of Greek theories of light with the respective hexaemeral theories and continue the story that Ronchi left untold, as the reception history of Greek theories of light by late antique biblical exegetes. But at this point Ronchi's narrative took a rather unexpected turn, expressed in the following astonishing remark:

The Greek philosophers do not appear to have taken upon themselves the task of determining the nature of light. What interested them most was to explain the mechanism of vision. In those days the main goal of thinkers was to learn to understand man, his functions and his faculties. Vision was one of the important faculties of man, and hence the answer to the question "how do we see?" became fundamental. Every physical entity exists because it produces effects. At that time the only known effect of light was vision, and it was natural therefore, that the study of light should begin from this point.<sup>13</sup>

For Ronchi, who at this point has been influential for all subsequent discussion, Greek thought did not ask the question: what is *light*? Instead, it asked the question: what is *sight*? This shift in the object of enquiry, sight instead of light, was for Ronchi empirically attested: that is what we get from the known sources. One may wonder whether Ronchi would be willing to reconsider if he were shown different textual evidence. Be it as it may, with him started a process of assimilation between the history of light and sight in modern historiography, a process through which the story of light became an integral part of the story of vision down to the seventeenth century.

Lindberg was one of Ronchi's severest critics. He bemoaned, amongst other things, the fact that Ronchi emphasised *light* over *sight*.<sup>14</sup> Given the fact that Ronchi in the end did not follow the path of an independent enquiry into the nature of light, but subordinated it to the study of visual theories, Lindberg's critique sounds, retrospectively, a bit overzealous. After all, Lindberg, too, acknowledged light as a possible field of independent historical study, but followed, in the end, the visual path inaugurated by Ronchi:

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<sup>10</sup> Ronchi (1939). All citations are from the English translation (1970).

<sup>11</sup> Lindberg (1976).

<sup>12</sup> Ronchi (1970), 2.

<sup>13</sup> Ronchi (1970), 4.

<sup>14</sup> See Lindberg (1971), 522.

Before 1600 the science of optics tended to coalesce around two interrelated, yet distinguishable, problems – the nature and propagation of light, and the process of visual perception. Either problem could serve as an effective starting point for an investigation of early optics, but the second is clearly the broader and more representative. The problem of vision not only embraces the anatomy and physiology of the visual system, the mathematical principles of perspective, and the psychology of visual perception, but it also requires us at least to touch upon the nature of light and the mathematics and physics of its propagation.<sup>15</sup>

Ronchi and Lindberg understood the historian's task of investigating light to be part of the history of vision. But that was the result of a *choice* or preference between two possible alternatives, the way of light and the way of sight. If they opted for the way of sight, it was because they thought it fitted better with how the source material treated the subject matter. The possibility of an independent enquiry into the physics of light in the pre-modern world was still a viable option, theoretically at least. But it was left for others to undertake. Today we know that volunteers have been scant. A survey of the existing literature betrays a steady preference for the visual approach.<sup>16</sup>

For Ronchi, Lindberg and many other historians of optics, the enquiry into the physics of light and its nature was a theoretically valid question, though not one that they could – or chose to – pursue in practice. That was not the case with another group of scholars who contested the *possibility* of a genuine enquiry into the physics of light in pre-modern thought altogether. The new thesis was first argued by one of the most influential voices in continental scholarship, that of Gérard Simon. Simon accused Ronchi and Lindberg of assimilating light (the light ray) to sight (the visual ray).<sup>17</sup> He thereupon completely rejected their approach, dedicating a whole book to showing that

the centre of the preoccupations of the Ancients is in no way the propagation of a ray but the positioning of an image, on account of the fact that they treat of vision and not like us of light.<sup>18</sup>

Simon's concern was that contemporary scholars, like Ronchi and Lindberg, read the sources anachronistically, though without being probably aware of it (*victimes d' une illusion rétrospective*):<sup>19</sup> they force the ancient texts by unduly modernising their meaning, assuming that pre-modern thinkers had the same interests as we do (*fausser indûment des centres d'intérêt qui ne sont plus les nôtres*), not realising that ancient sources were asking radically different questions from ours (*questions radicalement différentes*).<sup>20</sup> The reason is that there was *no physics of light* in the ancient world, only a concept of sight of which light was an integrated part: for the ancients 'it was impossible to pose the question of the physical nature of light independently of vision, since the *proprium* of light was to manifest things, whether

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<sup>15</sup> Lindberg, (1976), x.

<sup>16</sup> See, from recent literature, Zemplén (2005); Darrigol (2012); Siebert (2014). But cf. the suggestions of Berryman (1998), esp. 194-6: Euclid's visual ray model dependent on its underlying theory of light; Webster (2014): Euclidean *Optics* dependent on propositions and proofs from the astronomical tradition (celestial illumination).

<sup>17</sup> See Simon (1988), 23-4.

<sup>18</sup> Simon (1988), 25.

<sup>19</sup> Simon (1988), 23. See also Simon (1996), 11-29, with the charge against Ronchi and Lindberg on p. 16.

<sup>20</sup> Simon (1988), 25.

by dazzle or by making the blue, the red or the green visible.’<sup>21</sup> Simon, therefore, firmly argued that the history of optics was not the history of light, but the history of the transformation of a discipline and its subject matter: from sight to light (*du visible à la lumière*).<sup>22</sup> In drawing the epistemological consequences of his position, Simon went perhaps a bit too far in contesting the intelligibility of ancient theories altogether: ‘we do not understand the purpose, nor the interests, nor the intrinsic limits of ancient optics. This is at least what this book aims to establish.’<sup>23</sup> But this was consistent with his broader view on the archetypical function of vision in the ancient world.<sup>24</sup> For Simon, every transformation of optics was not epistemologically innocuous; it was a transformation of our theory of knowledge (*transformation de la théorie de la connaissance*). In the end, the passage from sight to light signified not merely a change of the subject matter of a scientific discipline but a broader change in the way we understand the objects of knowledge (*objets du savoir*).<sup>25</sup>

Simon’s view gained currency in continental scholarship and the passage ‘from sight to light’ became the quasi-motto of a certain way of understanding the history of optics: as a discontinuous narrative of the transformation of the concept of light, from an intrinsic feature of the mechanism of vision to an independent object of scientific enquiry. I shall from now on refer to this view as the ‘oculocentric’ thesis.<sup>26</sup> The thesis also found notable defenders in the English-speaking world. Perhaps the most eloquent example comes from a leading voice in Ptolemaic and Arabic optics, that of A. Mark Smith, who expounded the oculocentric view in a series of publications. Smith famously contested Lindberg’s view that the medieval perspectivist optical tradition was primarily concerned with the *physics of light*. Contrary to Kepler and his seventeenth-century successors, medieval Arabic and Latin thinkers ‘were far more concerned with making sense of sight than with understanding light.’<sup>27</sup> ‘The proper and primary end of perspectivist optics,’ Smith repeatedly argued, *pace* Lindberg, ‘was to make full and coherent sense not of light but of sight.’<sup>28</sup> Smith then generalised the thesis. In a recently-published monumental monograph Smith aimed to capture the whole history of optics as the transition from pre-modern to modern optics – the celebrated passage ‘from sight to light’ – as a *paradigm shift*. In the opening paragraph of his book Smith summarizes his thesis as follows:

[...] as currently understood, the science of optics is about light, about its fundamental properties and how they determine such physical behavior as reflection, refraction, and diffraction. But this understanding of optics and its appropriate purview is relatively new. For the vast majority of its history, the science of optics was aimed primarily at explaining not light and its physical manifestations, but sight in all its aspects from physical and physiological causes to perceptual and cognitive effects. Consequently, light theory was not only regarded as subsidiary to sight theory but was actually accommodated to it. And so it remained until the seventeenth century, when the analytic focus of

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<sup>21</sup> Simon (1988), 14. See also Simon (1996), 20-1: whichever ancient theory of light we take, ‘light always plays an auxiliary role (*un rôle d’adjuvent*), never that of a protagonist.’

<sup>22</sup> Simon (1988), 11-20. See also p. 89 for the transformation thesis in the context of Simon’s work.

<sup>23</sup> Simon (1988), 11.

<sup>24</sup> Simon (1988), 16-7.

<sup>25</sup> Simon (1988), 17. See also Simon (1996), 21-7. For ancient optics as part of Simon’s broader epistemological agenda see Caveing (2007).

<sup>26</sup> Simon is standard reference in French literature see, for example, Vasiliu (2010), 6, and Pardon-Labonnelie (2010), 45.

<sup>27</sup> Smith (2004), 181.

<sup>28</sup> Smith (2010), 165.

optics shifted rather suddenly, and definitively, from sight to light. Marking the turn from ancient toward modern optics, this shift of focus evoked an equivalent shift in the order of analytic priority. Henceforth, sight theory would become increasingly subsidiary to light theory, the former now accommodated to the latter.<sup>29</sup>

It is not difficult to perceive the common agenda between Smith and the continental school of thought. For Smith, too, there is a discontinuity between pre-modern and modern optics.<sup>30</sup> According to the pre-modern optical paradigm, light was not the primary object of scientific enquiry. That role was reserved for sight, while light was an enabler or a mediating factor. Only in that subsidiary sense was there conceptual space for an enquiry into light. To be clear, Smith did not go as far as to challenge the intelligibility of the ancient sources. But he did recognise the archetypal function of optics, acknowledging that the transformation of the visual model had ‘ramifications that extended well beyond its ostensibly narrow subject matter in light and sight.’ Thus, for Smith, the passage from sight to light caused a tremendous shift in the way people conceived the world, signifying not a mere transformation of a scientific discipline (optics), but a real paradigm shift in the Kuhnian sense (‘Keplerian turn’).<sup>31</sup> It was a change in world view, with ‘ramifications in such apparently disparate fields as theology, literature, and art.’<sup>32</sup>

I have here sketched the contours of the modern historiography of light, following the narrative that was first laid out in the works of Ronchi and Lindberg, noting a subtle but crucial turn in this narrative suggested by Simon and recently exemplified by Smith. If I am right, there seems to be considerable consent: the passage ‘from sight to light’ becomes the signpost of a certain approach to the history of optics that studies light as part of sight in the ancient sources. Beyond this, there is room for dissent: according to some, a vision-independent enquiry into the nature of light in ancient sources is – theoretically, at least – a viable possibility (Ronchi and Lindberg). According to others, the ‘oculocentric’ nature of ancient optics denies such a possibility. In its softer version (Smith), this latter view enquires into the nature of light in the pre-modern world as an integral, *auxiliary* part of the study of sight; the genuine enquiry into light as an ‘objective,’ *physical* agent in the world will have to wait for the paradigm shift that occurred in the seventeenth century.<sup>33</sup> In its stronger version (Simon), the oculocentric narrative precludes all possibility of light being *knowable as such* in the ancient world. Light was a *sui generis* construction, coextensive with sight. The ancients simply lacked any *independent* notion of light.<sup>34</sup>

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<sup>29</sup> Smith (2015), ix.

<sup>30</sup> Smith (2005), 180, 193-4; Smith (2010), 166.

<sup>31</sup> Smith (2015), x, 2, 277.

<sup>32</sup> Smith (2015), 277.

<sup>33</sup> According to Smith (2004), in the pre-modern optical paradigm of Alhacen and his Latin followers, ‘pure light is a mere theoretical abstraction’ (p. 183). In a pre-Keplerian context, ‘the science of optics is not about light-radiation, reflection, or refraction, as we understand them in the modern, objective sense, but about how we perceive things directly or by mediation of reflective or refractive surfaces’ (p. 191).

<sup>34</sup> See Simon (1988), 25-36. See further Blamont (2004), 199: ‘We should not search in ancient science for anything of what we nowadays call the explanation of the phenomenon of light. In fact, as Gérard Simon writes, ancient optics is in the first place an *analytics of vision*. None of our concepts (ray, image, visible, visual field, binocular vision, object, subject, etc.) are transposable as they are into ancient and medieval texts,’ (italics in the original; my translation).



Clearly, the oculocentric thesis presents a challenge for the study of hexaemeral light. It puts under scrutiny the basic intuitions of the biblical exegete who, like Ronchi, attributes to light a physical existence of its own, independent of a perceiving subject. More specifically, it questions the possibility of an enquiry into the nature of biblical light independent of a corresponding theory of vision. Taking the oculocentric thesis to its logical conclusions, there can be *no physics of light* in the biblical creation narrative, only a theory of vision to which light is somehow instrumental. But in the beginning, the biblical exegete may protest, there were no eyes to see the light. The first animals were created on the fifth day of creation, humankind on the sixth. Who was there to contemplate primordial light apart from God? And no mainstream theologian would want to understand God 'seeing' the light according to *Gen. 1:4* in a literal sense. Primordial light should then be conceived independently of any theory of vision. The ocularist thesis is surely inapplicable to the first light of creation. Or is it?

### III. Three arguments for oculocentrism in the hexaemeral literature

#### 1. Sight fantastic

The first chapter of *Genesis* does not say much about angels. In fact, it does not say anything at all. This was felt as a gap by late antique Jewish and Christian exegetes, who had to face the competition from rivalling accounts of the cosmogenesis.<sup>35</sup> The Babylonian creation myth opened up with a section on theogony to account for how order was bestowed upon disorder and the world came to be. Similarly, ancient Greek cosmogonies explained cosmic order by reference to the successive births of celestial and chthonian deities, their marriages and their battles. The educated pagan had in addition more philosophical creation myths at their disposal, like the Platonic *Timaeus*, which had something to say and even more to suggest on secondary gods and celestial daemons. The 'Gnostics' developed their own genealogies of Aeons and Archons, which they creatively embedded in their cultural milieu, drawing on the mythological, the philosophical and the biblical traditions. Add to that the Greco-Roman popular religion, with its focus on the life of the stars and their heavenly inhabitants. Nor must we forget that Jewish Second Temple literature had also its fair share in angelology, of which the Enochic literature is a fine specimen. In this context, the silence of the biblical creation narrative might be suspected of concealing more than it was revealing. Since angels were no strangers in the biblical world, Jewish-Christian readers demanded to know why Moses eschewed mentioning their creation. They also needed to know what the role of angels in creation was. That put the hexaemeral exegetes to work. The result was the emergence of a special section on angelology in hexaemeral literature. A parallel tendency can be observed in the rabbinic exegetical tradition, which developed a vivid interest in the question of the day that God created the angels (*Bereishit Rabbah* 1:3).

The hexaemeral exegetes justified the silence of the Mosaic account by appealing to the principle of 'considerateness' or 'condescension' (*sunkatabasis*) of Scripture: it was for the

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<sup>35</sup> On the interplay of Jewish, Christian, Gnostic, and Platonic cosmologies in late antiquity see Endo (2002); van Kooten (2005); Blowers (2008a), 908-11.

purpose of divine pedagogy that Moses did not include angels in the creation account.<sup>36</sup> For the proponents of the allegorical school, *sunkatabasis* meant that the creation of angels belonged to the deeper subtext of the creation narrative, concealed under the letter of the text for the sake of the uninitiated, 'who were unable to endure the burden of investigating matters of such importance.' Angelology was a teaching reserved for the spiritually advanced.<sup>37</sup> For the proponents of the grammatical-historical method, *sunkatabasis* meant that Moses did not mention the creation of angelic powers because of the immaturity of his audience 'and the materialism of his listeners.' Moses' main concern was to draw the Israelites away from the dangers of idolatrous polytheism. He thus chose to instruct them in natural theology, leading them 'for the time being from visible realities to the creator of all things, so that from created things they might come to learn the architect of all and adore their maker, not stopping short at creatures.' Only when the Israelites had matured in faith was the time ripe for them to be gradually initiated to the higher mysteries of creation that included the spiritual world.<sup>38</sup> What was common to both traditions was the key role of the reader and her capacity to discern the depth of Scripture. The teaching about the spiritual world was accessible only to the more advanced reader.

With this caveat in mind, the hexaemeral authors recognised a significant place for angels in the creation of the world. They were the spectators of God's work. We get a first hint about the role of angels as contemplators of creation from the longest fragment we possess from Origen's lost *Commentary on Genesis*.<sup>39</sup> The fragment comments on *Gen.* 1:14, which in the Septuagint version refers to the stars as being established 'for signs' (*eis sēmeia*). Origen found here the chance to provide a lengthy disquisition on astrology and the controversial question whether the stars are causes.<sup>40</sup> In his exegesis, which had a long-lasting effect in the subsequent tradition, Origen distinguished between the causal power of stars, which he rejected, and their power to predict future events, which he accepted. The underlying idea, which was certainly not original, was that the stars are like letters written in the sky, literally heavenly 'signs' written by God for the angelic powers to read, rejoice in, and be instructed, just as we are instructed by reading the Bible.<sup>41</sup> The image was borrowed from apocryphal literature, exploiting the analogy between the Torah and the world.<sup>42</sup> It is clear from this passage that angels had, apart from their ministering, also a contemplative role to play in the world. Origen did not specify whether the kind of vision angels employed had as its object the

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<sup>36</sup> On the patristic hermeneutics of *sunkatabasis* see Hill (1981), 3-11; Sheridan (2015), esp. 27-44.

<sup>37</sup> See Origen, *DP*, IV.II.7-8. The addressees of *sunkatabasis* are according to *DP* IV.2.4 the *simpliciores*. These again must be the early stage catechumens as we learn from *CC* II.4 and III.51.

<sup>38</sup> See Chrysostom *Hom. in Gen.* II.2-3 PG 53:28-9. The same teaching is repeated in *Serm. in Gen.* I.2 PG 54:582-3, with some extra material.

<sup>39</sup> This is fragment D7 from the *editio minor* by Metzler (2010), 70-152. The fragment is translated into English by Trigg (1998), 86-102, with notes and an introduction. Further leads are Origen's spiritual interpretation of 'heaven,' see Köckert, (2009), 256-67, and the doctrine of pre-existence of the rational souls, see Martens (2013). Both leads support the existence of angels, but do not tell us much about their corporeality. That is why I will not pursue them further.

<sup>40</sup> On the debate see Scott (1991), 145-6; Kalligas (2004), 278-82.

<sup>41</sup> We find the same idea in Origen's younger contemporary, Plotinus, see *Enn.* II.3.7 and III.1.6. The analogy and the striking similarity of the overall argument suggests a common tradition, like the Jewish, so Kalligas (2004), 292 (*ad Enn.* II.3.7.4-8), 434 (*ad Enn.* III.1.6.20-4), or a common source, like Ammonius Saccas, so Trigg (1988), 86, from which Origen and Plotinus drew.

<sup>42</sup> The image of stars as 'tablets of heaven' is cited from the apocryphal *Prayer of Joseph*, a work which must have exercised considerable influence but is otherwise lost, see Smith (1985); Hayward (2005).

sensible image of the stars or their intelligible principle. The question would be too long to discuss here, but a physicalist approach to angelic sight should not be dismissed out of hand. It suffices to say that there is enough evidence to suggest that Origen accepts an ethereal region in heaven along with an ethereal composition of the astral body of its angelic inhabitants and with some kind of idiosyncratic, heavenly or ‘spiritual’ senses.<sup>43</sup> All this strongly suggests that the angelic vision of the stars may be understood quite literally in the context of certain doctrines espoused by Origen.<sup>44</sup> Be it as it may, literally or figuratively, vision is a faculty that angels certainly possess.<sup>45</sup> If so, the ocularist thesis may be applied to the hexaemeral narrative in full force. Only a small substitution as regards the agent of vision needs to be made. Instead of light being instrumental to *human* sight it only needs to be instrumental to *angelic* sight.

Angelic sight was no Origenian fantasy.<sup>46</sup> The sources inform us that the contemplative role of angels in creation proved to be a long-lasting and widespread idea. It resurfaces clearly in the hexaemeral exegesis of late fourth – early fifth century Antiochene school, in the writings of Severian of Gabala and Theodoret of Cyrus, always in the context of citing *Job* 38:7. In his hexaemeral homilies, Severian discusses the nature and role of angels in creation while commenting on the ‘let us make’ clause of *Gen.* 1:26.<sup>47</sup> He rejects the view that angels could have been assistants of God and only accepts their role as ministers, witnesses and spectators (*theōroi*), watching (*blepontes*) all that followed their creation:

They [sc. the angels] watched (*eblepon*) heaven being made from what did not exist and were astonished; the sea being set within limits and were amazed; they contemplated (*etheōroun*) the earth being adorned and were startled. Since angels were not assistants but admirers, God tells *Job* “When I made stars, all the angels sang my praises.” (*In cosmogoniam* IV.6 PG 56:465 tr. Hill, slightly amended)

Theodoret discusses the issue even more extensively in his *Questions on the Octateuch*, a work of the genre ‘questions and answers.’ The *Questiones in Genesin* begin with four questions on the silence of the biblical text about the invisible, spiritual world. Three out of four questions focus specifically on angels, betraying vivid discussions in the background.<sup>48</sup> In

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<sup>43</sup> On the ethereal body of angels see Scott (1991), 150-64. On its theological justification see Edwards (2002), 94-7. On the ‘spiritual senses’ in Origen see the still influential article by Rahner (1932), which focuses on Origen’s mode of language of the perception of God. The question posed here goes in the exact opposite direction, i.e. how do angelic creatures and incorporeal souls perceive the *sensible* world. If we accept the theory of the ‘spiritual,’ ‘heavenly,’ ‘ethereal’ etc. body, then some kind of corresponding sense faculties must be attributed to it. That is how I understand the term ‘spiritual senses’ in this context. The only author who comes close to discussing this notion of spiritual senses in Origen is, to my knowledge, Dillon (1986), esp. 451-3.

<sup>44</sup> Origen, following his contemporary epistemology, for which see below, understands vision through a principle of ‘likeness’ or ‘sympathy’ between the sense faculty and the sense object, see e.g. *DP* I.1.7.

<sup>45</sup> On the ambivalence of Origen’s language of ‘spiritual senses’ see Louth (2007), 66-7. See also Coakley (2002), 136-41: figurative language; McInroy (2012): figurative and analogical, with an emphasis on analogical language. These authors, however, discuss the spiritual senses in the trajectory of Rahner (1932), which, as already mentioned, is not the direction I am taking here.

<sup>46</sup> See, for example, Plutarch, *De Is. et Os.* 360E: records of experiences (*pathēmata*) of daemons, who also share ‘in the nature of the soul and in the perceptive faculties of the body (*sōmatos aisthēsei*)...’ On the equivalence of Jewish-Christian ‘angels’ with pagan ‘daemons’ see below. For an excellent discussion of the materiality of angels/daemons in late antique literature see Smith (2008). If some sort of bodily existence of spiritual beings is allowed, then sense perception, including vision, is a mere logical inference.

<sup>47</sup> Severian, *In cosmogoniam*, IV.6 (PG 56:464-5).

<sup>48</sup> See Hill (2007), xlviii-xlix.

the fourth question, which is a dialectical refutation of the alleged pre-existence of angels based on an interpretation of *Job* 38:7, Theodoret expounds the same view as Severian:

Now, the angels were probably created along with heaven and earth so that on seeing (*horōntes*) the light created from no pre-existent material, the firmament fixed in the midst of the waters, the water separated from the land, the earth beautified with all kinds of plants as soon as God spoke, and everything else made at God's discretion, they might realize, through what they saw (*horōsin*), that they also have a created nature and receive existence from him. The holy apostle, in fact, links them to the world in saying, "We have become a spectacle (*theatron*) to the world, to angels, and to human beings." (*Quest. in Gen. IV.2* Petruccione 16.28-37 tr. Hill)

Severian and Theodoret argue explicitly for the role of angels as spectators of creation. They both follow the hermeneutics of *synkatabasis* as developed by Chrysostom.<sup>49</sup> The shared hermeneutics and argument suggest a common theme in the Antiochene school of thought, of which Severian and Theodoret are both adherents.<sup>50</sup> Angels were 'watching' (*eblepon*) the heaven being made (Severian); they were 'seeing' (*horōntes*) the first light (Theodoret); they were 'watching' (*eblepon*) the stars being made (?Theodore). That is precisely what the oculo-centric thesis needs in order to sustain itself in a hexaemeral context. If there were angels 'seeing' the primordial light the vision-centric interpretation of ancient theories of light cannot be dismissed out of hand. On this point the Antiochene meets the Origenian tradition.<sup>51</sup> The hexaemeral literature provides then a robust argument in support of the oculo-centric interpretation of ancient theories of light. It is true there were no human eyes present when God created light and the heavenly stars. But that does not mean that there were no eyes at all.

One may wonder whether the tactic of transferring the visual context from the human to the angelic realm is a prudent move to make. But the biblical universe is a world suffused with angels, and this is a non-negotiable framework for the biblical exegete. *Given* the existence of angels, the oculo-centric move does not come at any extra cost. It just makes use of the

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<sup>49</sup> See Severian, *In cosmogoniam*, I.2 PG 56:431-2; Theodoret, *Questions*, I-II PG 80:77-80 = Petruccione 6-11. The connection is noted by Hill (2007), 7-9 n.2 and (2010), 24-5 n.11.

<sup>50</sup> Further evidence: fr. 11 of the parallel catenist tradition (*Collectio Coisliniana*), cited at the beginning of this section, expressing a view very close to Severian. The text is traditionally attributed to Severian, but the elements of creation that the angels contemplate in the text and in the passage from the *In cosmogoniam* are not identical. Thus the editor, in my view rightly, suspects a different attribution from within the Antiochene school, most likely Theodore of Mopsuestia, see Petit (1986), *ad loc.* with note. Relevant are also two fragments from Diodore of Tarsus, fr. 16 and fr. 43bis (*Collectio Coisliniana*), accepting a spiritual heaven for the invisible and intelligible substances, i.e. the angels, with a role analogous to the one that the visible heaven plays for us.

<sup>51</sup> See two examples: 1) Ambrose *Exameron* II.4.15: the powers (*potestates*) which are in the visible (!) heaven (*visibili loco*) 'behold' (*spectent*) and 'observe' (*conspectibus habeant*) 'all this' (*haec omnia*). The reference of *haec omnia* is unspecified. But the immediate context is about the visibility of heaven, with the distinctively Platonist etymological tradition of '*ouranos apo tou horasthai*,' see *Opif.* 37, going back to *Rep.* 509d3, implied also by *Tim.* 23b7-8, with *Crat.* 396b6-c1 in the background. The whole context refers to visible creation, most probably the entire celestial creation (*omnem celestis creaturaem*), citing also *Ps.* 18:2. In this context, the passage gives clearly the theme of angels as spectators of creation. 2) Didymus *Commentary on Genesis* 76.15-9: Discussion of the pre-existence of angels in the context of *Job* 38:7, at which point the commentary is suddenly interrupted for several pages. This appears to be the view discussed by Theodoret in *Questio* IV PG 80:81-4 = Petruccione 14-19, also espoused by Severian and fr. 11 from the parallel catenist tradition (*Collectio Coisliniana*), with the caveat made by Theodoret *ad loc. in fine*. Though speculative, the literary context and the mention of *Job* 38:7 leave, in my view, no doubt that in the missing part of the commentary Didymus elaborated on the contemplative role of angels in creation.

premises already available to the biblical exegete. If so, the hexaemeral authors were essentially right in putting the hand in the cookie jar. If there are angels in the world, simple curiosity compels the biblical reader to ask about their place and role in creation. The allegorist may refrain from saying too much and the literalist may send warning signs against asking too much about what lies beyond the letter of the text. In the end, however, both allegorist and literalist have to say something about spiritual beings. What they give us is a story about vision: angelic powers contemplate God's work, take pleasure in it and learn from it. With this kind of story, oculocentrism becomes possible for hexaemeral light. The fuzzy ontological status of the angelic spectators ('created *before* creation') complicates the *metaphysics* of vision a bit. But the underlying *hermeneutical* principle may very well hold. All metaphysical weirdness aside, light may indeed function, purely and simply, as an instrument of angelic sight.

## 2. A world with a view

Angel-sight and the celestial book of signs evoke something of childhood memories to the contemporary reader. The world of late antiquity, however, is a world where some of our fairy tales come true. In this world daemonology, the pagan equivalent of angelology, is discussed in literary circles and is part of the philosophical curriculum.<sup>52</sup> Calcidius, a fourth-century philosopher and, allegedly, a contemporary of Athanasius and the Cappadocians, begins the second part of his Latin commentary on the *Timaeus* with the section on the four kinds of living beings and the heavenly gods (*Tim.* 39e3 sqq. = *Calc. In Tim.* 119 sqq.). The passage had already become the *locus classicus* of pagan philosophical speculation on daemons through the mediation of a rich interpretative tradition.<sup>53</sup> Calcidius opens his remarks by recalling the purpose of the *Timaeus* – contemplation of nature (*contemplatio naturae*). He then enumerates the four kinds of sentient living beings, celestial and terrestrial, and proceeds:

Not confining himself to treatment of the aforementioned living beings, he extends his attention to unravelling the question of the angelic nature, the beings he refers to as daemons. Of these, the purer type has its abode in the ether, the second in the air, the third in the region named the moist substance, such that the internal parts of the world are filled with living beings endowed with reason and no region of it is deserted. And this treatment he necessarily postpones, since it is of a higher order and beyond the contemplation of nature... (*In Tim.* 120 tr. Magee; my transliteration for *daemon*)

Though Calcidius acknowledges that the *Timaeus* is a work on physics (*physica*) and therefore not suited for a discourse on the nature of daemons, he continues on the subject for several pages, drawing on the wider Platonic corpus (127-36).<sup>54</sup> Midway, Calcidius makes an

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<sup>52</sup> On pagan daemonology and its sources see the excellent studies of Timotin (2012) and Mihai (2015). The marriage of philosophical daemonology with biblical angelology goes back to Philo of Alexandria, see *Somn.* I 141: what the philosophers call 'daemons' Scripture calls 'angels'; Timotin (2012), 100-12; and Calabi (2008), 111-25, esp. 118: 'Indeed, for Philo, the name "daemons" is equivalent to the term "angels," it just belongs to a different theoretical sphere: the former is a Platonic name, the latter a Biblical one.'

<sup>53</sup> On Calcidius' daemonological section see den Boeft (1977); Somfai (2003), 129-42. On the tradition see below.

<sup>54</sup> On Calcidius's sources of inspiration see Somfai (2003), 131-2.

astonishing and valuable remark on the harmony of the Platonic with the Judeo-Christian tradition on celestial beings:

The view held by the Hebrews is in accord with this as well, for they claim that the God who conferred order upon the world bade that the sun's province should be to rule over the day, and the moon's to keep watch over the night, and that he also disposed the other stars as the limits, as it were, between temporal periods and as the signs of the years, as indication also of future events. (*In Tim.* 130 tr. Magee)

The passage that Calcidius paraphrases is none other than *Gen.* 1:14. We have seen how this passage was used by Origen to argue for angels as spectators of creation. We have also seen how this theme was disseminated in the subsequent tradition. Thereupon, Calcidius sees no problem in expressly identifying the Platonic talk of 'daemons' with the Judeo-Christian talk of 'angels' (132-3). His definition of a 'daemon' as 'a rational, immortal, passible, ethereal living being engaged in the care of human beings' (135) is representative of Middle-Platonic daemonology but resonates equally well with Jewish-Christian angelology.<sup>55</sup> In his eyes, clearly, angels and daemons have the same reference.

The case of Calcidius shows that even as late as the fourth century it was possible to consider the *Timaeus* creation myth and the *Genesis* creation narrative as sources of parallel and compatible hermeneutical traditions. They could be regarded as anagogical discourses on physics. And they both seemed to serve a common purpose: contemplation of nature.<sup>56</sup> They could equally classify as works on natural philosophy or natural theology. In both of them contemplation was not a role exclusive to humankind, as we would today assume. Spiritual beings, whether angels or daemons, were the contemplators of nature *par excellence*. The interpretative steps leading – not without jumps – from the *Timaeus* to late antique daemonology have been thoroughly investigated in recent scholarship.<sup>57</sup> In an excellent study, Andrei Timotin has explored the development of the daemonological theme in Platonism.<sup>58</sup> In a programmatic paper, Keimpe Algra has investigated its reception in

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<sup>55</sup> The definition resembles that of Apuleius' in *De Deo Socratis* 13, as shown by den Boeft (1977), 38, and Dillon (1996), 318 n.1, but the crucial formula *diligentiam hominibus impertiens* ('engaged in the care of human beings') is Calcidius' addition. The idea of daemons 'caring' for human affairs goes back to Hesiod, *Works* 123 (daemons as 'guardians (*phulakes*) of mortal men') and seems to echo in the myth of the *Statesman* 271d-e, see Timotin (2012), 69-72. But it later acquired a stronger sense of 'ministering' human beings almost contemporaneously in the Jewish, the Christian and the Platonist tradition, with striking similar vocabulary, cf. the Philonic formula *hupēretisi kai diakonois* (*Gig.* 12); the 'Pauline' formula *leitourgika pneumata eis diakonian apostellomena* (*Hebr.* 1:14); and Plutarch's formula *hermēneutikon kai diakonikon genos* (*De Is. et Os.* 361C; *De def. or.* 416F). Through his own formula of *diligentia hominibus* Calcidius was able to engage simultaneously audiences from the Jewish-Christian and the Platonist tradition (or was conversely drawing from his own schooling in them).

<sup>56</sup> That anagogical contemplation of creation is the purpose of patristic hexaemeral exegesis has been demonstrated by two wonderful studies, see Pelikan (1993), esp. 90-106; and Blowers (2008b). The theme has a 'Platonic' ring, see the magisterial study of Köckert (2009), esp. 528-30. In the Platonist tradition the theme climaxes in Plotinus' (singular) insight in *Enn.* III.8 that 'nature contemplates,' see the classic study of Deck, (1967); and more recently Wildberg (2009). Calcidius confirms this picture: anagogical contemplation of nature is no genuine hexaemeral insight. But see below on the Christological transformation of the theme in the hands of the hexaemeral authors.

<sup>57</sup> See Colpe *et al.* (1976); Brenk (1986).

<sup>58</sup> See Timotin (2012). Still to be consulted are the relevant sections from Dillon (1996), 31-2, 90-1, 171-4, 216-9, 287-8, 317-20, limited, however, to Middle-Platonism.

Stoicism.<sup>59</sup> John Dillon and Francesca Calabi have highlighted different perspectives of the theme in Philo, and David Runia has shown how it entered the hexaemeral tradition through the *De opificio*.<sup>60</sup> Allan Scott has extended this path down to Origen.<sup>61</sup> I have shown above how the trajectory reached the rest of the hexaemeral tradition and cited Calcidius better to illustrate a hexaemeral author's literary context. Add to this the proliferation of daemonology in 'Neoplatonism' and we can now have a better glimpse into the hexaemeral world.<sup>62</sup> It is a *physical* universe that does not exhaust itself at a materialist mechanics of nature but also includes the quasi-physical mechanics of spiritual powers. In this world, the starry sky is full of life. Hexaemeral *physics* includes the material but invisible inhabitants of the heavenly regions, in which also humankind originates. Hence the astonishing remark, for modern ears, that Basil makes regarding the heavenly (literally) origins of humankind. In reprising the Timaeian theme of the sky as the original abode of humankind (*Tim.* 90a), filtered through the Stoic-Philonian image of the cosmos as a great city (*megalē polis*),<sup>63</sup> Basil allows himself to say:

In this city in which is our ancient home (*en tē polei tautē, en hē ē archaia patris hēmōn*), and from which the man-slaying demon drove us, selling mankind into slavery by his allurements, here, I say, you will see the first origin of man and death, which immediately seized upon us and which had been begotten by sin, the first-born offspring of the demon, source of evil. (*Hex.* VI.1 GCS 88.12-6 tr. Way)<sup>64</sup>

Basil then espouses a world of Stoic-Platonic coded echoes, according to which the cosmos is a 'mega-city' and humankind its proper citizen (*cosmopolitēs*).<sup>65</sup> This world, filled with earthly

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<sup>59</sup> See Algra (2011).

<sup>60</sup> See Dillon (1983) and the commentary in Winston and Dillon (1983), 236-44; Runia (1986), 227-31; Calabi (2008), 111-25.

<sup>61</sup> See Scott (1991), 113-49.

<sup>62</sup> See Zintzen (1976); Nasemann (1991); Wilberding (2006), 206-7.

<sup>63</sup> See Runia (2001), 339-40 (§142), 341-2 (§144).

<sup>64</sup> The text has clear Plotinian resonances, see *Enn.* I.6.8.16-28, though for Plotinus the original home of the soul is supra-worldly. As Kalligas (2004), 213-4, has shown, the imagery was not original but was in wide use in Homeric interpretation and the novelistic literature inspired by the Mystery cults. Rudberg in the *apparatus fontium* of the critical edition (GCS p. 88) cites as examples Plato, *Rep.* 592b; Cicero, *Nat. deor.* II.62.154; Clement, *Strom.* IV.26. He further cites the hexaemeral homily IX.2 (CGS pp. 148.23-149.10) which reprises the theme with a clear allusion to *Tim.* 90a. All these are references to the Platonic imagery of the heavenly city and its Stoic re-interpretation of the cosmos as a city. Basil's use of the imagery has created a stimulating controversy between Rousseau (1994), 318-49, 320 (the 'ancient fatherland' is 'a world that was invisible and eternal,' i.e. paradise), and Costache (2013b), 108-9 (the phrase "ancient fatherland" is not to be found in the *Hexaameron* nor does it refer to paradise as a heavenly realm). As regards the text, Rousseau is right: the locution 'ancient fatherland' (*archaia patris*) is used verbatim in the passage cited. As regards the context, Costache can cite in support *Hom.* 336.7 (*Quod deus non est auctor malorum*, PG 31.314-5), while Rousseau may respond by citing the third homily of the *Creat. hom.* (for its authenticity see below), which uses the same language of *patris* and *politeuma* as here, suggesting carefully but clearly that paradise, though material, is not a place on earth, but the dwelling place of the saints. Both sides are partly right. The language of the hexaemeral passages (VI.1 and IX.2) is loaded with Platonic allusions, too suggestive of paradise as a heavenly realm to be taken as a simple metaphor. But this realm is not disembodied, as it is e.g. for Plotinus. It is the heavenly cosmos, the supralunary, or, as Mihai (2015) has argued, a special region of it, astonishing as this may sound to modern ears.

<sup>65</sup> On the Hellenistic ideal of cosmopolitanism see Schofield (1991); on its hexaemeral appropriation see Runia (2001), 103 (§3), 339-40 (§142).

and heavenly life, is itself a living being.<sup>66</sup> As a living being it has a soul and a body.<sup>67</sup> If it has a body it might also have some kind of sense perception. This raises the question of cosmic vision. The idea that the world had a faculty of vision had wide currency in the religious – mystical milieu of the imperial era, strongly associated with the Egyptian and the Chaldean cult, and was discussed vividly in literary and philosophical circles.<sup>68</sup> It continued to generate stimulating discussions in late antiquity, as we can judge from Proclus’ vivid interest in the matter in his *Commentary on the Timaeus*.<sup>69</sup> Proclus reports on two tendencies: a poetic-theological tradition, reaching back to the Homeric worldview and identifying the sun, the moon and the stars with celestial eyes; and the explicit contrary view of Plato in the *Timaeus* (33c1-4), which had its special weight among the Platonists. Proclus’ own solution lies somewhere in between, allowing for a *sui generis* cosmic perceptual apparatus, which does not operate like our bodily sense organs. Having explored this idiosyncratic faculty of cosmic perception, Proclus remarks:

For as a whole it [sc. the world] is itself both a thing that is seen and an eye, since we say that the sun is an eye as well as each of the stars. Therefore the whole cosmos is both vision and what is visible, and it really is ‘grasped by perception and opinion’ (28a2) by virtue of its sensing itself and holding opinions concerning itself, for it is grasped by these [sc. perception and opinion] in the primary manner. (*In Tim.* II.84.5-10 tr. Baltzly)

Proclus’ testimony is crucial. It allows for an oculocentric move that is not available to the contemporary reader. If the sun and the moon, but also the stars, function, for Proclus and the tradition he represents, as heavenly eyes through which the world sees itself, oculocentrism is right at home in the philosophical context of hexaemeral writings. How seriously can hexaemeral authors take such an oculocentric cosmology?

It appears that hexaemeral authors take the possibility of cosmic vision quite seriously. We have two influential testimonies. Basil mentions twice the image of the sun and the moon as celestial eyes, and so does Ambrose, who depends largely on Basil. In Basil the image is a simile:

[The sun] is as conspicuous in creation as (*hoionei*) a radiant eye. (*Hex.* VI.1 GCS 89.13-4 tr. Way)

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<sup>66</sup> See *Tim.* 32c2-31a1; 39d8-e2; 92c5-7 and the collection of Stoic passages in Long and Sedley (1987), 313-9 (§53) with commentary 319-23. On Plato’s cosmobiological model and its philosophical background see Lloyd (1966), 232-72; for its Stoic development see Hahm (1977), 136-84; for late antique Platonism see Clark (2016), 209-25; for Plotinus in particular see Wildberg (2009), 143: spiritualisation of the entire universe as the apex of ancient Greek speculation about nature. Twentieth century scholarship has often dissociated Christianity from this worldview, see Zachhuber (forthcoming), with critical discussion. This led to the widely held assumption that Basil rejected the notion of the world as a living being, see Louth (2009), 52. As van Kooten (2003), 169-70, 175-9, has convincingly shown, however, the cosmobiological model together with the idea of the cosmic city find clear scriptural expression in the Pauline literature, especially in *Eph.* 3:10 and 3:14-21. Basil’s worldview draws then upon genuine scriptural premises. The cosmobiological model is clearly introduced in the hexaemeral homilies through the identification of the spirit hovering over the waters in *Gen.* 1:2b with the Holy Spirit, expressly indicating the life-giving power (*zōtikēn tina dunamin*) animating the universe (*pros zōogonion*), see *Hex.* II.6 GCS 31.1-22 and further Nyssen *In Hex.* 19 GNO 31.7-32.19.

<sup>67</sup> For the scriptural background see the magisterial discussion of van Kooten (2003), 9-58: the term ‘body’ (*sōma*) in *Col.* 2:19 should be understood as referring to the body of the cosmos.

<sup>68</sup> See Pardon-Labonnelie (2010), 45-64.

<sup>69</sup> See Proclus *In Tim.* II.81.12-85.31.



The earth had received its ornamentation from its own plants; the heavens had received the flowers of stars and had been adorned with two great lights as if (*hoionei*) with the radiance of twin eyes. (*Hex.* VII.1 GCS 111.4-7 tr. Way)

But the *hoionei* clause is dropped in Ambrose and what remains is the claim that the sun and the moon are truly the eyes of heaven:

It is true that it [sc. the sun] is the eye of the world (*oculus mundi*), the joy of the day, the beauty of the heavens, the charm of nature and the most conspicuous object in creation. (*Exam.* IV.1.2 tr. Savage)

The heaven, too, with the sun and the moon, the twin lights of its countenance (*uultus*), and the splendid array of the stars shone forth. (*Exam.* V.1.1 tr. Savage)

The eyes in man correspond to the sun and moon in the heavens. The sun and moon are the twin lights of the firmament (*Exam.* VI.9.55 tr. Savage)

Taken out of context, Ambrose's remarks may sound like a colourful figure of speech.<sup>70</sup> The purpose of this section has been to place even the most literally inclined hexaemeral authors, like Basil, in their own cosmological, literary and religious-mystical context. Read in this context, the imagery of celestial eyes cannot be dismissed as merely ornamental. In the hands of Ambrose, the imagery perfectly matches the poetic-theological tradition reported by Proclus. It is meant in a literal sense, not as a mere figure of speech. In the hands of Basil, the imagery is nuanced by a literary trope, an *hoionei* clause. This places Basil on the side of the other tradition reported by Proclus together with traditional Platonism. Ambrose and Basil become exemplary cases of a distinctive oculocentric theme and its possible modes of appropriation in hexaemeral hermeneutics. The image is taken seriously, whether in a literal sense or as a literary device appealing to a late antique author's intellectual milieu.<sup>71</sup> This seriousness provides a further argument in support of the oculocentric thesis. Next to primordial light, which is the object of contemplation of spiritual-angelic beings, now celestial light appears to emanate from luminous eyes in the sky, namely the sun, the moon and the stars. If so, the hexaemeral world is, truly, a world with a view. It looks down upon us and in so doing it brings light and sustains life on earth.

### 3. A Christocentric vision of creation

Next to angel-sight and celestial vision there was a third, more down-to-earth move available to hexaemeral authors in support of oculocentrism: the teleological interpretation of creation. The Septuagint text offers two hints pointing towards such an interpretation. In verses 1:14-9 (fourth day), the Greek grammar suggests a purposive role of the heavenly bodies: they are intended to illuminate the earth and to produce the seasons etc. (1:14-5 *eis*

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<sup>70</sup> Or they are not understood. Compare, for example, Ambrose's text with Savage's translation. Ambrose writes: '*caelum quoque sole et luna geminis uultus sui luminibus stellarumque insignitum decore fulgebat*' (CSEL 140.10-2). Savage translates: 'The sun, too, and the moon, those twin luminaries, and the stars in their splendour shone fourth in the heavens' (V.1.1 Savage 159). Savage's translation conceals that the sun and the moon are the twin lights of a (heavenly-cosmic) face – *uultus*, completely untranslated – and mistakenly assumes that the heaven (*caelum*) is the object of the verb (*fulgebat*) in accusative, while it is the subject in nominative.

<sup>71</sup> As Clark (2016), 210, nicely puts it, 'people in "pre-modern" times lived, literally, under the eyes of heaven.'

+ accusative denoting purpose or intention); they are meant to separate day and night (1:14 articular infinitive in genitive denoting purpose); their purpose is to send their light to earth (1:15 and 17 *hōste* + infinitive expressing an intended result).<sup>72</sup> Similarly, in verses 1:28-30 (sixth day), the whole vegetative and animal world is portrayed as a kingdom offered to humankind to conquer and rule. The underlying idea is that the celestial bodies, the animals and the plants are created to serve the human being in one way or another. The hexaemeral authors made this idea more explicit.

The teleological approach enters hexaemeral literature with Philo's *De Opificio*, exactly where we expect to find it: the exegesis of the fourth (*Opif.* 53-4) and the sixth day of creation (*Opif.* 77-8). The exegesis of day four contains the Philonic version of a known Timaeian theme, the so-called 'encomium of sight' (47a-c).<sup>73</sup> The purpose of the original encomium becomes clear if it is combined with another Timaeian passage (90c-d). We then get the picture of sight as supremely beneficial to human affairs because it enables the contemplation of the motions of the heavenly spheres, visible expressions themselves of the motions of the world soul. Sight becomes our ticket to supreme happiness. It generates genuine philosophical enquiry about the world enabling us to achieve the best mode of life, an emulation of heavenly divine life. The language of the Timaeian text is expressly purposive (47b5-6). The goal of vision is the contemplative emulation of the revolutions of the heavenly spheres by the intellect. The function of vision is in turn embedded in a global teleological framework (69a): the animal species are necessary for the human species to appear (90e-92c); vegetation is necessary to maintain the human body (77a-c); the human body is necessary for the rational soul to remain on earth (69c; 89d); sight is necessary for the soul to find its way back to heaven (90a). But to do so sight needs light (45b-46a). In this global teleological scheme, it takes only a small interpretative step for the Timaeian exegete to *infer* that light is an instrument of sight – a purely oculocentric thesis that is not explicit in the *Timaeus* itself. Indeed, we find the instrumental role of light articulated in the later interpretative tradition, of which Philo was part.<sup>74</sup> It is only natural that in his hexaemeral adaptation of the Timaeian theme Philo makes the oculocentric premise explicit:

Knowing that light was the most excellent of things that exist, he [sc. the Maker] produced it as an instrument for the most excellent of the senses, sight. (*Opif.* 53 tr. Runia)

The encomium of sight was one way of expressing the teleology of creation. Another way was to consider humankind as the goal towards which the structure of the world was directed. This anthropocentric focus of natural teleology had an equally long prehistory of philosophical discussions. The thread goes back to Anaxagoras as well as to Xenophon's Socrates and Aristotle, as David Sedley has recently shown, and is transmitted to Philo via Stoic adaptations.<sup>75</sup> In its Stoic version anthropocentric teleology means that the world is a product of divine benevolence whose *ultimate* beneficiaries are its human and divine residents. Since the divine residents of the world are already good and happy, it is only human beings that

<sup>72</sup> For the grammar of the Septuagint verses 14-9 see Alexandre (1988), 134-5.

<sup>73</sup> See on this Runia (1986), 270-6; Runia (2001), 200 (§53) and 201 (§54).

<sup>74</sup> See Philo *Abr.* 158-9; Apuleius *De Platone* I.10; Calcidius *In Tim.* 244. Runia (1986), 274, commenting on the *additions* brought by Philo to the Timaeian encomium of sight remarks: 'Philo shows an unashamedly anthropocentric tendency which goes further than Plato would allow (cf. *Laws* 903c). The heavenly bodies have been created for the specific purpose of providing light and ministering to sight (*Abr.* 158, cf. *Opif.* 77).'

<sup>75</sup> See Sedley (2007).

need to strive towards these same goals. The world is therefore designed to provide systematic support in their quest. Food, health and eyesight are part of the supporting mechanism and that puts the whole vegetative and animal realm together with the sun, the moon and the stars in the game (global teleology).<sup>76</sup> That is precisely the idea behind Philo's second aforementioned passage, the exegesis of day six (*Opif.* 77-8).<sup>77</sup> In addressing the apparently disputed question why God created human beings last, Philo's answer is Stoic anthropocentrism adapted to fit in a biblical dress. God designed everything so that when humankind came to be all of nature's supporting system would be at place.

So for the living being which was dearest and closest to him in nature he [sc. God] made everything ready in advance, it being his will that once the human being had come into existence, he would lack nothing that was required both for life and for the good life, the former furnished by the abundant supply of things that give enjoyment, the latter by contemplation of the heavenly realm, which strikes the intellect with wonder and engenders in it the passionate desire to gain knowledge of what it observes. (*Opif.* 77 tr. Runia)

Philo also supplied three celebrated images to illustrate the anthropocentric teleology of his hexaemeral exegesis: the world as a cosmic banquet; the world as a cosmic stadium; and the world as a cosmic theatre. In all three images everything needs to be prepared before the guests or the spectators arrive. Only then can the meal, the games or the drama begin (*Opif.* 78). We can see how this anthropocentric teleology promotes the oculocentric thesis. All light, from primordial light to the light of the sun, the moon and the stars, is so designed to support the human species in attaining its final goal. The achievement of the goal passes through contemplation which, in turn, requires the faculty of sight.<sup>78</sup>

Philo's anthropocentric teleology was destined to have a long-lasting career in hexaemeral literature. We find it right at home in the Origenian tradition. The anthropocentric interpretation is manifest in Origen's hexaemeral *Homily on Genesis*, which is an exercise in moral allegory. In transforming the creation narrative into a narrative about our inner progress towards perfect rationality, instantiated in our union with Christ, Origen integrates fully the anthropocentric agenda in his hexaemeral exegesis.<sup>79</sup> The whole universe is tuned

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<sup>76</sup> See Sedley (2007), 231-2.

<sup>77</sup> I here extend Sedley's interpretation of Stoic anthropomorphism to Philo. For a less charitable interpretation of Philonic and subsequent Christian anthropocentrism, according to which 'animals as inferior beings are subject to man' see, e.g. Floridi (1997), 37. Such interpretations still echo Lynn White's (1967) negative valorisation of biblical anthropocentrism. As Harrison (1999), esp. 90-6, has shown, however, such interpretations fail to see that patristic hexaemeral exegesis emphasized the moral-allegorical interpretation of *Genesis* 1:28, seeing in the 'dominion over the earth' the 'dominion of the rebellious beasts within.' I am here claiming that the same charitable interpretation of hexaemeral anthropocentrism is possible even without finding recourse to allegorical exegesis.

<sup>78</sup> But cf. *Opif.* 84: All the creatures in the sublunary realm are subordinated to the human being 'excluding the creatures of heaven.' See also Runia (2001), 248 (§77.2): no human dominion over the heavenly realm. In my opinion, Philo's anthropocentrism must be mitigated as regards heavenly light, because a different view would undermine the contemplative needs of angels/daemons, who are the proper residents of heavens, see Runia (2001), 256 (§84), further *Gig.* 6-18, with the commentary of Winston and Dillon (1983), 235-44, and the essay of Dillon (1983), 197-205. Consequently, light cannot be fully subordinated to human sight. Its final goal is to serve both human *and* angelic vision, as already discussed. Only with this caveat can Philo subscribe to the anthropocentric interpretation of light. The same is true also for the hexaemeral authors discussed below.

<sup>79</sup> See *Hom. in Gen.* I.11 GCS 13.18-23; I.12 GCS 14.5-6: the whole world anticipated the coming of humankind, for which it was created. The position is argued extensively in CC IV.74-99.

to support our encounter with Christ. In his homily, Origen combines Christocentric allegory with an anthropocentric interpretation of the luminaries in heaven:

As those lights of heaven which we see have been set 'for signs and seasons and days and years,' that they might give light from the firmament of heaven for those who are on the earth, so also Christ, illuminating his Church, gives signs by his precepts... (*Hom. in Gen.* 1.6 GCS 7.24-8.2 tr. Heine)<sup>80</sup>

The anthropocentric interpretation of the Hexaemeron is also manifest in Didymus' *Commentary on Genesis*, which exhibits evident traces of Philonic and Origenian thought.<sup>81</sup> Two convergent themes run through Didymus' hexaemeral exegesis: the grand design underlying the cosmos and the perpetual moral progress of humankind in achieving 'Christlikeness.' The two themes are revealed as the reader contemplates the number symbolism and narrative sequence (*akolouthia*) of Scripture. The implicit but clear suggestion is that the sacred text functions as the literary mirror-image of the cosmos – a leitmotif that runs through Philo's and Origen's hexaemeral exegesis.<sup>82</sup> Didymus' sublunary world is teleological ('nothing was created in vain' 42.10) and made 'to meet human needs' (33.11-4; 42.5-10; 67.14-68.3). Humankind, being made in God's image, is a governor (*archon*) ruling over all terrestrial life forms (57.10-3).<sup>83</sup> The stars in the sky have the task (*ergon*) of illuminating the earth, separating day from night and revealing (*phanerountes*) the measures of time – an anthropocentric labour (36.16-37.1). At a higher level, the purpose of the stars is to reveal the cosmic design and beauty of creation and in so doing lead anagogically, through contemplation of heavens, to the knowledge of God (74.9-17). Didymus' universe is anthropocentric and fine-tuned. The images that Didymus uses to express this global fine-tuning are those of a cosmic choir or an army (68.9-18; 74.17) but also of a city or kingdom in which the creator God is governor and king (57.10-3).<sup>84</sup>

The torch of anthropocentrism is next passed on to the Cappadocians, who had direct knowledge of Origen's and most probably also of Philo's hexaemeral work.<sup>85</sup> Basil's

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<sup>80</sup> But cf. I.12 *in fine*: equal honour of humankind with the luminaries in the sky, esp. the sun and the moon. See also CC IV.77: humankind is only one class of rational beings served by light of the sun and the moon, the other class being angels or daemons. But in the same passage Origen allows for an alternative interpretation according to which the sun and the moon serve exclusively rational beings in the sublunary, i.e. humankind, while rational beings in the supralunary do not stand in the same position as regards day and night (presumably because they are served by the light of the stars). Origen's double interpretation is another evidence, next to the ambivalent interpretation of the *Timaeus*, that one could argue both ways for the anthropocentrism of the light of the sun. Be it as it may, the anthropocentrism of heavenly light (which is not limited to the light of the sun) is mitigated by the needs of the heavenly residents of the universe.

<sup>81</sup> See Nautin and Doutreleau (1976), 22-4; Runia (1993), 197-204; and now the detailed study of Rogers (2017).

<sup>82</sup> For Philo see Runia (2001), 106-7; for Origen and the Church fathers see Blowers (2008b), 147-76.

<sup>83</sup> The imagery is distinctively Philonian, see *Opif.* 83: *hēgemonā kai despotēn* of the animals; *Opif.* 84: *basilea* of the sublunary.

<sup>84</sup> City or kingdom *per implicationem* since God is governor and king (*archon kai basileus*) of the universe. The imagery is again characteristically Philonian, see *Opif.* 17.

<sup>85</sup> For teleology as the culmination of the apologetic agenda of Cappadocian natural theology see the magisterial Gifford Lectures of Pelikan (1993), 152-65. On the influence of Philo on the Cappadocian hexaemeral project see the study of Runia (1993), esp. 235-41 (Basil), 241 (Nazianzen), 251-6, 261 (Nyssen). This does not mean however that the reception was uncritical as two seminal studies have recently shown, see McGuckin (2005), 38-54; Bouteneff (2008), 121-68. When I speak of Philonian-Origenian influence henceforth I fully side with Zachhuber (2014), 163-74, who has argued that Gregory's *De Opificio* attempts 'to offer a modified Origenism sustainable

*Hexaemeron* here lays the groundwork. The homilies manifest a Philonic anthropocentrism to which they add an Aristotelian teleological framework.<sup>86</sup> The whole work is based on Basil's adaptation of Aristotle's leitmotif that 'nature does nothing in vain.' This is given in the first and the last homilies, which develop the Aristotelian theme in a twofold meaning: the first homily suggests that the teleological principle is part of a global teleological scheme.<sup>87</sup> The ninth homily contains the applications of the principle for the local teleology of plants and animals.<sup>88</sup> In between we are given to understand that the purpose of the *Hexaemeron* is the analogical contemplation of the world. Contemplation will lead us to the sublunary and the study of the teleological structures of all terrestrial life forms culminating in the human being, following Aristotle's biological programme (*Homilies* VII to IX). But before focusing on the microcosm contemplation will pass through the supralunary and the vision of 'the indescribable beauty of the stars,' according to the Platonic paradigm (*Homily* VI).<sup>89</sup> Basil's world is a teaching-ground (*didaskaleion*) of divine pedagogy.<sup>90</sup> From a global teleological point of view, even the celestial bodies with their light are in the service of humankind. The point is made explicit in Basil's exegesis of *Gen. 1:14*, following the Origenian interpretative

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under the requirements of late fourth-century orthodoxy' (p. 173). In my view, this holds true for the Cappadocian hexaemeral project on the whole.

<sup>86</sup> For an excellent recent defence of Basil's anthropocentrism see Costache (2013b). On the vexed question of Basil's sources see the survey of the discussion in Köckert (2009), 322-4, 323 (Aristotle: at least mediated if not direct knowledge), 323-4 (Philo: with reservations). I do not see any reason for reservations as regards the use of Philonic material, as attested by all specialists, see Giet (1950), 49-51; de Mendieta (1985), 364-5; Runia (1993), 237-8, 241. The only (unanswerable) question is whether Basil's knowledge of Philo is mediated or not. But the same *aporia* applies also to the use of Aristotelian material.

<sup>87</sup> This is very controversial in Aristotelian scholarship, but not indefensible, see Sedley (1991), 179-96, with the *status questionis* on p. 179 and an update on the debate in Sedley (2007), 197 n.55. In order to explain his anthropocentric interpretation of Aristotle's teleology Sedley borrows his paradigm from Stoic cosmology, see pp. 179-80. In my view, so does Basil, see *Hom. 1.6* GCS 11.7-13 tr. Way (modified): '[You will find that] there was some creative (*technikos*) *logos* directing the orderly arrangement of visible things, as the word '*archē*' shows you. Moreover, you will find that the world was not devised at random or to no purpose, but to contribute to some useful end and to the great advantage of all beings, if it is truly a training place for rational souls and a school for attaining the knowledge of God, because through visible and perceptible objects it provides guidance to the mind for the contemplation of the invisible [...]'

<sup>88</sup> In an influential article James Lennox has argued Aristotle's teleological maxim has two contents. The negative content explains the absence of a feature while the positive content explains the presence of a feature, see Lennox (2001). This seems to me to be the position of Basil in *Hom. IX.5* GCS 155.1-2 tr. Way: 'If you observe carefully the members even of the animals, you will find that the Creator has added nothing superfluous, and that He has not omitted anything necessary.'

<sup>89</sup> The theme of contemplation of the universe preoccupies mainly (but not only, see e.g. *Hex. I.7* GCS 12.16-7) the opening of the sixth homily, where we also find three celebrated hexaemeral Philonic images entailing anthropocentric teleology: the word as stadium, as theatre and as a great city. The positive use of *philotheamōn* (VI.1 GCS 88.1) is in a way Platonic (see *Rep. 475e*) though the negative connotation is more characteristic of Plato (see *Rep. 476ab, 479a*: lovers of sounds and sights incapable of contemplating the forms). In Plotinus the original Platonic ambivalence is retained since the term denotes neutrally the contemplative nature, while the positive or negative outcome of contemplation depends on its direction, see *Enn. III.8.4.5*, 15-35. The positive use of *philotheamōn* in the specific context of philosophic contemplation of the heavens, as here, seems to be Middle-Platonic, see Plutarch *De curios.* 517D1 (see further positive uses in *De Pyth. or.* 394F3; *Quest. conv.* 673B6), and most notably Philonic, see *Opif.* 158; *Her.* 79; *Spec.* III.191.

<sup>90</sup> An Origenian insight, see Köckert (2009), 307, 318. For Basil see Costache (2013b), esp. 110-22.

tradition.<sup>91</sup> It is also made in the exegesis of *Gen.* 1:4 at the end of Basil's lyric encomium of light, from where is also the following quotation:

'And God saw that the light was good.' What could we say that would be worthy praise of light which beforehand possesses from the Creator the testimony that it is good? Among us speech reports the judgment made by the eyes; even so, it is unable to say anything at all as great as our senses previously have borne witness to. But, if beauty in the body has its being from the symmetry of its parts with each other and from the appearance of beautiful colour, how, in the case of light, which is simple in nature and similar in parts, is the idea of beauty preserved? Or, is it that the symmetry of light is not evinced in its individual parts but in the joy and pleasure at the visual impression? In this way even gold is beautiful, which holds an attraction and pleasure for the sight, not from the symmetry of its parts, but from the beauty of its colour alone. And the evening star is the most beautiful of the stars, not because the parts of which it was formed are proportionate, but because from it there falls upon our eyes a certain joyous and delightful brightness. Then, too, the judgment of God concerning the goodness of light has been made, and He looks not wholly at the pleasure in the sight but also looks forward to the future advantage. For, there were not yet eyes able to discern the beauty in light. (*Hex.* II.7 GCS 33.6-22 tr. Way)

The whole world then, beginning with the first light, anticipates the advent of humankind. So does also Basil's audience, which is gradually led to realize that day six is the apex of creation's grand design. But that is where the homilies come to a rushed end, with an unfulfilled promise to return to the creation of humankind in more detail at a later moment (*Hex.* IX.6 GCS 160.14-5). Whether the promise was ever fulfilled is a vexed question in Basilian scholarship. There are three possible places to look for an answer: 1) the *De opificio hominis* of Gregory of Nyssa;<sup>92</sup> 2) two homilies *De creatione hominis* of Basilian inspiration, to which occasionally a third homily is added in the manuscript tradition;<sup>93</sup> 3) the Basilian homily 319 on the words *attende tibi ipsi* (*Deut.* 15:9).<sup>94</sup> Each of these works adopts an explicitly anthropocentric agenda with strong echoes of Philonic-Origenian thought.<sup>95</sup> I shall concentrate briefly on

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<sup>91</sup> With Origen's exegesis of *Gen.* 1:14 in the background (Metzger fr. D7), Basil stresses the usefulness (*chrēsimos*, to *ōphelimon* VI.4 GCS 94.9, 95.12) and service (*etachthēsan* VI.8 GCS 103.19) of the luminaries, but refrains from subordinating them entirely to humankind.

<sup>92</sup> Gregory himself claims in the preface that the work was written in fulfilment of Basil's promise, see Forbes (1855), 104 (=PG 44:125C).

<sup>93</sup> The current scholarly consensus is that the three homilies contain authentic basilian material which was edited later, i.e. after Basil's death, from within his immediate circle in fulfilment of the said promise (*Hex.* IX.6 GCS 160.14-5), see the detailed argumentation of Smets and van Esbroeck (1970), 13-134; concurring opinion of Hörner (1972), vii-ix. The opinion of the editors has been accepted in scholarship, see de Mendieta (1973), 713-6; Rousseau (1994), 318-63, esp. 318 n.1; Bouteneff (2008), 136-7.

<sup>94</sup> Gronau (1914), 3-4, 281-93, suggested that this was Basil's 'tenth hexaemeral homily,' based on the excursus in *Hex.* IX.6 GCS 157.22-6 and the content of homily 319. In my view, there is too strong intertextual evidence to overlook at Gronau's suggestion. Basil, Gregory and Ambrose all refer to the '*attende tibi ipsi*' in order to show that contemplation of nature culminates in contemplation of the self, see Basil *Hex.* IX.6 GCS 158.1-10; Gregory *Opif. hom.* XXIX Forbes 290.9-10 (=PG 44:237D-240A); Ambrose *Exam.* VI.6.39, 7.42. This exegetical strategy can be best explained with homily 319 in the background. Though I do not go as far as to embrace Gronau's view, since the tenth homily was never written, I tend to think that the *attende tibi ipsi* is the common material behind Gregory's *Opif. hom.* and the basilian *Creat. hom.* The interconnection needs further investigation.

<sup>95</sup> The point is well argued in two influential studies at the beginning of the previous century, see Robbins (1912), 4-6, 56-7, with more emphasis on teleology; and Gronau (1914), 146-73, 281-93, with convincing evidence, with the exception of the now dated thesis that Posidonius' Timaeon *Commentary* was the underlying common source. Gronau's view is reprised by Runia (1993), 253, as regards Gregory of Nyssa. The Philonic influence on the *Creat. hom.*, probably through Origenian mediation, is also affirmed by Runia (1993), 240-1.

Basil's *Homily* 319 here which contains material used in both Basil's and Gregory's hexaemeral work. The homily builds on *Deut.* 15:9 as the biblical adaptation of the Delphic adage 'know yourself,' though perhaps *Deut.* 4:9 would have been a more adequate biblical *locus* to deliver the same message. From a hexaemeral point of view, the homily exploits the idea that the human being is a 'little world' (*mikros diakosmos*, PG 31:215-6=Rudberg 35.15).<sup>96</sup> This gives rise to the broader idea that contemplation of the world culminates in contemplation of the self. The expression and the argument bring immediately to mind the macrocosm/microcosm analogy, which in a hexaemeral context is further evidence of Philonian-Origenian inheritance.<sup>97</sup> It is therefore no surprise that the homily contains perhaps the fullest expression of Cappadocian anthropocentrism. Heavenly light is part of this anthropocentric hexaemeral world. It is worth quoting *in extenso*.

[...] you are a human being, the only one of the animals formed by God. Is this not enough to be reasonable grounds for the most exalted joy, that you have been entirely formed by the very hands of God who has made all things? That since you have come into being according to the image of the Creator you can ascend quickly toward equality of honour with the angels through good conduct? You have been given an intellectual soul, through which you comprehend God, you perceive by thought the nature of beings, you pluck the sweetest fruit of wisdom. All the land animals, domesticated and wild, and all those living in water, and all those that fly through the air, belong to you as slaves and are subject to you. Further, have you not invented arts, and built cities, and devised all the things pertaining to necessity and luxury? Are not the oceans passable for you through reason? Do not earth and sea serve your life? Do not air and sky and dancing stars disclose to you their pattern? Why then are you downcast because your horse does not have a silver-mounted bridle? Yet you have the sun carrying its torch for you in a swift race through the whole day. You do not have the luster of silver and gold, but you have the moon with its limitless light shining around you. You have not mounted a chariot inlaid with gold, but you have feet as a vehicle proper and adapted by nature to yourself. Therefore, why do you call happy one who has a fat purse but needs the feet of others to move around? You do not lie on a bed of ivory, but you have the earth which is more valuable than great amounts of ivory, and your rest upon it is sweet, sleep comes quickly and is free from anxiety. You do not lie beneath a gilded roof, but you have the sky glittering all around with the inexpressible beauty of the stars. (PG 31:212-3=Rudberg 33.5-34.6 tr. Harrison)

The torch of anthropocentrism is further passed on to hexaemeral authors that were further influenced by Basil's thought. The thread leads to Ambrose,<sup>98</sup> Chrysostom<sup>99</sup> and beyond. But I will draw a line here because I think the point has been made adequately clear that anthropocentric teleology is ubiquitous in hexaemeral thought.<sup>100</sup>

It is time to draw some conclusions. On the basis of the above collection of passages it is evident that the anthropocentric interpretation of the *Hexaemeron* puts light in the service

<sup>96</sup> A common Cappadocian doctrine, see *Creat. hom.* II PG 44:293B; Nazianzen *Orat.* 38.11 (*In theophania* = PG 36:321D-324A); see further Pelikan (1993), 121-3, on the influence of Macrina. On the seemingly ambivalent stance of Nyssen see Zachhuber (2014), 167, 234 n.16.

<sup>97</sup> See e.g. Philo *Opif.* 25, 69, 82; Origen *Hom. in Gen.* I.11 GCS 13.21-2. On the analogy in Philo see Runia (2001), 227 (§69.2a), 254 (§82); for Origen see Köckert (2009), 267. The most informative treatment of the subject is still the monograph of Conger (1922), esp. 29-37, with a survey of Christian microcosmic theories.

<sup>98</sup> Just indicatively see *Exam.* VI.1.2: the world as theatre; VI.5.30-35: teleological explanation of animals and their parts – nothing was created in vain; VI.6.39 and 7.42: *attende tibi ipsi*.

<sup>99</sup> Again, only as a foretaste, see *Hom. in Gen.* VI.6 PG 53:61a: encomium of sight; VII.3-4 64d-66a: design argument – rejection of materialism – nothing was created in vain; VII.6 67c-68a: human authority over the sub- and the supralunary; 67d: image of creation as a banquet; VIII.3 72d: human authority over everything on earth.

<sup>100</sup> See the excellent survey of Steiner (2005), 112-31.

of humankind. By rendering light an *instrument* of sight, hexaemeral anthropocentrism promotes the oculocentric thesis in a double respect. Celestial light *enables* the contemplation of the sublunary world, allowing us to perceive its teleological hierarchy and structure. But celestial light is at the same time the most beautiful *object* of contemplation in the world, instructing us in the immeasurable beauty, power and creative genius of its divine artificer. In both respects, light becomes the medium *and* the apex of the contemplative work. It must be noted, however, that hexaemeral anthropocentrism is only one side of the story. The other side is the theocentric hermeneutics of creation since anagogical knowledge of God is the sole purpose of the contemplative work. In between hexaemeral theocentrism and anthropocentrism stands the image of God. This image, visible in the person of Christ, brings the two hexaemeral opposites to a harmonious balance.<sup>101</sup> The new story of creation becomes the story of the union of the human with the divine *logos*. Christ – the *logos* incarnate – becomes the meeting point of the two hermeneutical axes of creation, theocentric and anthropocentric.<sup>102</sup> As Christ fulfils his earthly mission and ascends into heaven, the microcosmic ('local') teleology of the sublunary finds its culmination point in the macrocosmic ('global') teleology of the supralunary. With their anthropocentric and teleological interpretation of the creation narrative the hexaemeral authors initiate the reader in a vision of double anticipation: the whole universe anticipates the coming of humankind just as humankind anticipates the coming of Christ. The Hexaemeron then revisits anthropocentrism and proposes instead a Christocentric teleological scheme for the interpretation of the world. If so, salvation history begins with eyesight: contemplation of nature reveals the forthcoming image of God. Remember here the previous two oculocentric arguments discussed above: angel-sight and celestial eyes. They now reveal their true purpose. Angelic and cosmic vision need to be integral parts of the hexaemeral narrative because the heavenly beings participate fully in the emergent cosmic theology: *all* rational creatures, from angelic and celestial beings reigning in heaven to the human being reigning on earth, are made to contemplate the cosmos and in so doing be instructed in creation's true *telos*, the incarnation of the *logos*. Humankind is only the last thread in a great chain of rational beings, to reprise Lovejoy's celebrated theme, that is instructed in the universe's deeper secret. Angels together with the stars are anticipating Christ from the beginning of time (or very close to that). That seems to be what the hexaemeral narrative is all about. A genuinely oculocentric narrative then it is.

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<sup>101</sup> The complementarity of 'theocentric anthropology and anthropocentric cosmology' in Patristic thought, culminating in Christology, has been wonderfully argued by Meyendorff (1983), 34-6. On the Christocentric transformation of teleology in Patristic literature see the magnificent essays of Pelikan (1993), esp. 280-95; Blowers (2012); further Knight (2007), with a special focus on Maximus the Confessor. Theokritoff (2008), 70-1, rightly remarks that Patristic 'anthropocentrism' should not be confused with the modern notion of anthropocentrism as 'a human self-centredness altogether incompatible with theocentric anthropology.' But the contemplative-anagogical program of the *Hexaemeron* culminating in the Christocentric hermeneutics of creation clearly rules out such a possible misunderstanding.

<sup>102</sup> This point is best expressed in the Johannine literature. As Endo (2002) has meticulously shown, the Johannine Prologue is written from the background of a Christological reinterpretation of the biblical creation narrative. It is the same Christological vision of creation that animates all patristic light-imagery, see Wallraff (2001), 41-59. This idea is magisterially expressed in Origen's allegorical interpretation of light in his hexaemeral (first) *Homily on Genesis*. That means that Origen's (allegorical) reading of *Gen. 1* through the lens of *John 1* is no Origenian fancy, but a reading of *Genesis* based on genuine Johannine premises.



## IV. Re-thinking oculocentrism

### 1. Narrowing down the scope

Undeniably, the oculocentric thesis offers a powerful hexaemeral narrative. So compelling that one surely hesitates before suggesting contrary evidence. But the close study of the sources raises pressing questions, with perhaps surprising answers. Take Philo's appropriation of the Timaeian 'encomium of sight,' for example. David Runia has meticulously compared the Philonic (*Opif.* 53-4) and the Timaeian (47a-c) versions and shown several key differences beyond the striking similarities.<sup>103</sup> The first difference is that the Timaeian version is an encomium of *sight*, while the Philonic version is an encomium of *sight and light*, importing extra material from the *Republic* (507-9). In assessing the special weight of the two themes (*sight* and *light*) in their Philonic synthesis, Runia remarks that 'the encomium of *sight* is subordinated to the encomium of *light*.'<sup>104</sup> But the oculocentric thesis insists that it *ought* to be otherwise. First need for qualification. By the time of Basil, the subordination of *light* to *sight* is almost complete. The relevant passage from Basil's *Hexaemeron* (II.7 GCS 33.6-22, quoted above *in extenso*) shows that Basil has almost entirely replaced *sight* with *light*. The Basilian exegesis of *Gen.* 1:14 is a genuine encomium of *light*, to which *sight* is the *instrument* of perception. *Sight* is clearly subordinated to *light*. Second need for qualification. But when Philo and Basil are in accord, there is little room for manoeuvre. In the hexaemeral traditions that Philo and Basil represent *sight* becomes subordinated to *light*. These two traditions cover the whole spectrum of early Jewish-Christian hexaemeral exegesis. What varies in between is not the relation ('if') but only the degree ('how much') of subordination. Third need for qualification. As regards the 'encomium of *sight*' all evidence speaks for its transformation into an encomium of *light*, in which *sight* plays the auxiliary part.

Or, take the anthropocentric teleology of the hexaemeral worldview as a second example. From the point of view of global teleology *light's* place in the world seems to be auxiliary to *vision*, supporting its final goal: contemplation of the world. But here too qualification is needed. In the grand scheme of the All, *sight* is only a means to an end, a necessary but not sufficient condition of contemplation. Even animals have the ability to look at the sky, though they are not able – as far as we know – to infer the existence of God. Theistic proofs, like the 'cosmological argument' and the 'argument from design,' require a rational agent able to infer, through the processing of facts and events, a first cause. 'Contemplation of the world' then is a process extending over several perceptual and cognitive steps, *vision* being only an initial one of them. But it is the whole process that the hexaemeral authors have in mind when they speak of the world as a teaching-ground. The goal of *sight* in the *Hexaemeron*, following the Timaeian tradition, is not exhausted in *vision*, i.e. the raw sensory input from the visual organ. The goal of *sight* is to serve as springboard for the reflective process to begin (with or without the combination of the other senses). In other words, 'contemplation' is reflective *vision*, according to the formula 'sense perception + a *logos* account.' In a global teleological scheme, then, *light* does not stop at *vision*. Its ultimate goal is to enable reflection and in so

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<sup>103</sup> See Runia (1986), 270-6, 354.

<sup>104</sup> Runia (1986), 271.

doing to disclose the beauty, order and intelligent design of the world. In this respect, light serves a greater purpose: it reveals to the contemplative eye the demiurgic divine attributes underlying the cosmos. In other words, light is not for the sake of the eye but for the sake of the reflective beauty and goodness of the All.

The above qualifications narrow down the field of application of pure oculo-centrism considerably. Once the global perspective is taken out of the equation what is left is the role of light in local teleology, i.e. its role in the proper function of the organ of sight. Remember that the three oculo-centric moves discussed above, namely angelic, celestial and human sight, require some (more or less exotic but nonetheless physicalist) faculty of vision. Remember also that the mechanism of vision is the focal point of the current discussion in the history of optics. In the soft oculo-centric version of Smith light plays an *auxiliary* role in vision. In the strong oculo-centric version of Simon light is *co-extensive* with sight. Oculo-centrism then can be narrowed down to the role of light in the mechanism of vision. The theory of vision is the testing ground on which the oculo-centric hermeneutics of hexaemeral light stands or falls.

## 2. Sight is light

The theories of vision underlying hexaemeral literature have not yet been the object of study in contemporary scholarship. But we are not entirely without a clue. In a seminal paper, David Hahm has prepared the ground by sketching the contours and providing many details of the theoretical framework that was available to the hexaemeral authors.<sup>105</sup> Hahm's study identifies three major Hellenistic theories of vision which, according to the author, remain essentially the same throughout antiquity. They are also the major theories available to the hexaemeral authors:

From the Hellenistic period down through late antiquity three distinct theories of vision competed for attention – namely, those of the mathematicians, the Epicureans, and the Stoics. By the first century B.C. these three theories had eliminated all earlier competitors. A fragment of an optical treatise attributed to Geminus (first century B.C.) states that optics is not concerned with the physics of vision, but only demands that the rectilinear propagation of light or vision be preserved. Hence optics does not decide whether 1) 'rays are poured out from the organs of sight and effluences travel to the surfaces of objects, or 2) images (*eidōla*) streaming off from perceptible bodies in rectilinear motion penetrate the eyes, or 3) the intervening air [between the object and the eye] is extended together with, or carried along with (*sunekteinetai ē sunekferetai*), the raylike *pneuma* of the eye.' Apparently, these three theories were the only options a student of optics had to consider.<sup>106</sup>

Hahm's argument proceeds in three steps. It gives a survey of the three theories of vision just mentioned.<sup>107</sup> It concludes with the investigation of the corresponding theories of colour.<sup>108</sup> In between, it discusses at length the Timaeian theory of light and colour<sup>109</sup> 'because it provides the background against which the Hellenistic theories of vision had to work,' since

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<sup>105</sup> See Hahm (1978), 60-95.

<sup>106</sup> Hahm (1978), 61.

<sup>107</sup> Hahm (1978), 61-9.

<sup>108</sup> Hahm (1978), 75-88.

<sup>109</sup> Hahm (1978), 69-75.

‘each of the Hellenistic theories shows an influence of its basic assumptions.’<sup>110</sup> If Hahm is correct, the Platonic *Timaeus* is the common theoretical background of Hellenistic and late antique theories of vision. At the same time, however, as we know from the landmark studies of David Runia (1986) and Charlotte Köckert (2009), the *Timaeus*, in its reception, is also the major philosophical influence behind hexaemeral literature. And as I have argued up to now, the *Timaeus* and its interpretative tradition is how oculo-centrism enters the doorstep of the hexaemeral world. Connecting the threads, Hahm’s suggestion about the background influence of the Timaeian theory of vision on Hellenistic and late antique sources can be extended and applied to the hexaemeral sources as well. Let us then find out what this influence means in practical terms.

The Timaeian theory of vision is based on the combination of three different streams of fire or light. It is wonderfully summarized by Thomas Johansen as follows:

Our light-bringing eyes (*phōsphora ommata*) were composed of the same sort of fire as daylight. This is a special sort of fire that does not burn but spreads “a gentle (*hēmeron*) light proper to each day (*oikeion hekastēs hēmeras*)” (45b4–6: clearly a pun). The pure fire inside us is “a brother” (*adelphon*) of the daylight of each day. The fabric of the eyes is fine so that only this pure fire will be let through. Whenever daylight (*methēmerinon phōs*: the punning continues) surrounds the stream of pure fire coming from the eye, like falls upon like (*homoion pros homoion*) and the two bodies of light coalesce. They become one body reaching out in a straight line from the eyes. Because the entire ray of light is similar (made of the same sort of fire) it becomes “sympathetic,” capable of being affected in a similar way. So whenever the ray hits upon an object and is affected by it, the affection spreads along the ray into the body all the way to the rational soul in the head. It is this affection which we call vision. The kinship between the outer and inner light is further emphasized when Timaeus explains why vision does not happen when the light disappears at night. The pure fire coming from the eye then meets with darkness outside and is thereby cut off from its related (*suggenous*) fire. Meeting what is unlike (*anomoion*), the fire from within is extinguished. It is no longer *sumphues*, congenial with, the adjacent air. So vision can no longer take place.<sup>111</sup>

The Timaeian theory of vision is based on the combination of three streams of light: the visual ray, daylight, and the colour perceived, commensurate with the visual ray. Timaeian sight then is the coalescence of streams of light emanating from three different sources: the eye, the source of illumination of the surrounding environment and the object of vision. In other words, Timaeian sight is luminocentric: it is the coalescence of light with light. The fact that the Platonic theory of sight is luminocentric is attested also elsewhere in the Platonic corpus. We find it explicitly stated in the celebrated ‘sun simile’ in the *Republic*, where sight is described as being causally dependent on the sun (*aitios*) and thus the most ‘sunlike’ (*hēlioidestaton*) of the senses (and not the sun being ‘eye-like’, 508a11-b11). The *Timaeus* and the *Republic* both affirm the affinity of sight with light. The *Republic* causally subordinates sight to light, while the *Timaeus* explains the reason of this subordination: sight is the coalescence of light with light.<sup>112</sup>

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<sup>110</sup> Hahm (1978), 75.

<sup>111</sup> Johansen (2014), 110-1 (transliterations in the original).

<sup>112</sup> On the luminocentrism of *opsis* in the *Republic* see the epoch making doctoral thesis of Beierwaltes (1957), 40-3. See also Ferguson (1921), 132-3: ‘The sole object of this argument [sc. the analysis of sight] is to extract a single system, that of light, from the material cosmos which will serve the purpose of his [sc. Plato’s] analogy.’

The luminocentric nature of the Platonic theory of light is constantly affirmed in the interpretative tradition. We find it clearly stated in a much-discussed fragment from Posidonius' theory of vision, echoing the *Timaeus*.

And as light, says Posidonius in expounding Plato's *Timaeus*, is grasped by sight that is luminous (*phōtoeidous opseōs*) and sound by hearing that is airy, so too the nature of all that there is should be grasped by the *logos* that is akin to it. (fr. 85 tr. Kidd)

We find the same doctrine, together with the Posidonian terminology of '*photoeidēs*,' in Alcinous' summary of the Timaeian theory of vision.

Having placed upon the face the light-bearing eyes (*phōsphora hommata*), the gods enclosed in them the luminous aspect of fire (*tou puros to phōtoeides*), which, since it is smooth and dense, they considered would be akin to the light of the day. (*Didaskalikos* 18.1.1 tr. Dillon)

The luminous nature of sight is also constantly stressed by Plotinus. It is paradigmatically formulated in a celebrated line from *Ennead* I.6 (*On Beauty*), echoing the *Republic*.

For no eye has ever seen the sun without becoming sun-like (*hēlioeidēs*). (*Enn.* I.6.9.30-1 tr. Gerson)

In his *Commentary on the Timaeus*, Calcidius summarizes the Platonist theory of vision and brings the message of its luminocentric character home clearly:

The primary cause of seeing is the internal light; but it is not in every respect complete and sufficient for the performance of its apportioned task, since assistance is required from cognate external light, above all that of the sun... (*In Tim.* 244 tr. Magee)

With the above hermeneutical framework in mind, let us go back to the hexaemeral sources and have a fresh look at the Philonic 'encomium of sight and light' (*Opif.* 53-4). We find first the characteristically oculocentric premise of light as an instrument (*organon*) of sight. But oculocentrism gives way as we read on: the eye has need (*chreios*) of light in order to see; through light (*hupo phōtos*) sight is drawn upwards and contemplates the motions of the heavenly bodies. Recall now Runia's lead that Philo is here combining material from the *Timaeus* and the *Republic*.<sup>113</sup> It is the same line of interpretation that we have just seen in Posidonius, Plotinus and Calcidius. We now have all the information necessary to decode the meaning of light as an 'instrument' of sight. The reference is clearly to the external light which activates the mechanism of vision. But this is so because of the application of the principle of 'like to like.' External light is an instrument of sight in the sense that its coalescence with the light of the eye is the necessary and sufficient condition for vision to occur.<sup>114</sup> Philonic sight then is the coalescence of light with light and as such it is, typically, luminocentric. Through Philo luminocentrism enters the hexaemeral world. Basil's encomium of light shows that Philo's luminocentric premise is still valid even when Philo's name is no longer mentioned explicitly as a source of information.

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<sup>113</sup> See Runia (1986), 274.

<sup>114</sup> To the possible question whether colour, too, is a necessary condition of vision in the Timaeian tradition, the answer is in my view negative. Colour is the object, not the condition of vision. But it is a moot point since, once vision is activated, the eye sees the light even in the absence of any other colour. Light then is the necessary and sufficient condition of sight.

Let us now briefly go back to the oculocentric arguments discussed above, angel-sight and celestial eyes, and compare them with the Platonic theory of sight. All of a sudden, what seemed to be an oculocentric hexaemeral world is transformed into a luminocentric universe. Take for example the angels. It is now clear that they are able to perceive the light of the stars because of the principle of likeness that explains Platonic vision. Just as in human vision the internal light coalesces with the external light that comes through the eye, so too in angel vision does the light of the stars coalesce with the light that comes through the angelic, ethereal or astral – hence ‘luminous’ – body. Take again the imagery of the sun, the moon and the stars as celestial eyes. This is now explained through the macrocosm/microcosm analogy, which allows the stars to become explanatory models for the mechanism of vision: just as the luminaries in heaven shed forward the light that they have inside (light ray), so too the eyes transmit the light that is inside the human body (visual ray). The metaphysical weirdness of ‘angel-sight’ and ‘celestial vision’ gives way to a much more coherent explanatory framework once we become aware of the basic premise of the Platonic theory of vision: the eye is ‘sun-like,’ whether angelic or human, in the sense that it emulates the basic function of the sun shedding its light to the world. It is a world full of light.

For the hexaemeral authors, who, like the rest of the natural philosophers of their time, adopt the luminocentric premise of the Platonic visual paradigm, oculocentrism is a position very difficult to uphold. That compels me to part ways with the oculocentric thesis. From an oculocentric perspective, light is vision-dependent. Ancient optics is an *analysis of sight* and light is part of this analysis. From a hexaemeral perspective, however, and its intellectual milieu, the analysis of sight requires a further *analysis of light*. The analysis of light, in turn, leads to the realm of physics.<sup>115</sup> Vision becomes in this way a special field of application of the *physics of light*. The oculocentric view denies that there is any physics of light in the pre-modern optical paradigm. The luminocentric view considers sight as a special field of application of the general physics of light. Clearly, the two views are worlds apart and cannot be reconciled with each other. In the following chapters, I will proceed with my own reading of the sources and present the evidence for the physics of light that I think is abundant in the hexaemeral literature and its context. Before I do so, however, I need to say a final word about the role of vision in the pre-modern, hexaemeral paradigm, and its relation to light.

### 3. From the phenomenal to the noumenal

Implicit in the oculocentric thesis is the modern critique of the pre-modern scientific paradigm. According to Smith light was part of the perceptual apparatus of the pre-modern mind, cognitively bound to it. Light mediated, together with colours, the subjective realization of an object in the mind through the very act of seeing. The object itself was ‘not actually there’ but ‘merely implied, or intended.’<sup>116</sup> The premise of ‘intentionality’ was abandoned with the transition from pre-modern to modern optics, a transition that was discontinuous

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<sup>115</sup> See Berryman (2012), 201-20: from the point of view of Hellenistic and late antique natural philosophy the proper analysis of sight is subject to the study of the physical principles underlying it. See moreover Berryman (1998), 194-6, and the fragment from the optical treatise attributed to Geminus (1<sup>st</sup> century BC) in Schöne (1897), 22-4: from the point of view of geometrical optics visual rays are theorized as rays of light.

<sup>116</sup> See Smith (2004), 187-94.

and revolutionary, a true paradigm shift in the Kuhnian sense.<sup>117</sup> According to Simon, the modern paradigm introduced the notion of an 'objective' physical light, *independent* of the perceiving 'subject.'<sup>118</sup> The oculocentric school, following Simon, identified the modern concept of light with 'our' light, i.e. with the concept of light of the contemporary reader.<sup>119</sup> The alienation of the contemporary reader from the pre-modern concept of light is the implicit assumption of the oculocentric thesis. It is an assumption with which I can find no common ground at all.

From the point of view of the history of ideas, the modern paradigm is not itself invulnerable to criticism. Such criticism has been the task of postmodern thought, which has re-invited the pre-modern, participatory paradigm and re-instated it as a valid source of inspiration in contemporary discussions. The contemporary, postmodern reader may thus feel more in tune with the pre-modern rather than with the modern worldview.<sup>120</sup> The rejection of the medieval paradigm and its underlying metaphysical premise of 'intentionality,' for example, is a curious argumentative choice made by the proponents of the oculocentric thesis. In twentieth-century philosophical discussions Scholastic 'intentionality' has been rehabilitated through the influential work of Franz Brentano and has, since then, played a central role in both analytic and phenomenological schools of thought.<sup>121</sup> If the pre-modern optical paradigm is 'intentional,' then so be it. The question is what we make of it.

Even more curious is the strong defence in oculocentric literature of the concept of an 'objective' light as part of the modern paradigm. The defence of scientific objectivism is surprising since post-Einsteinian physics has abandoned the presuppositions of classical physics, namely the Newtonian core assumptions of absolute space and absolute time, which enable the assertion of a straightforward objective reality of the physical world. But the notion of an 'objective' light is incoherent without such presuppositions. Post-Einsteinian light, on the contrary, is not 'objective' but 'relational.' It is part of a quantum world in which indefiniteness, nonlocality and entanglement or 'togetherness' are actual properties of particles, including photons. In the quantum world light is neither 'here' nor 'there,' but 'here – there'; it is neither wave nor particle, but 'wave – particle.'<sup>122</sup> Quantum properties of light, like relationality, nonlocality and duality, are counterintuitive to the modern mind, which is trained to perceive the world through the spectacles of an 'objective' physical reality. But perhaps quantum properties are much less counter-intuitive to the pre-modern mind. Late antique and hexaemeral physics assumed physical properties of the world, like the gradation of its material constitution, that may sound just as counterintuitive to modern ears as quantum properties. One way of reading the Timaeian narrative through the eyes of a hexaemeral author is to suggest that in its pre-cosmic state the material world was in an indefinite condition manifesting all possible states of materiality at the same time. A contemplative divine act shaped the world into a cosmos through the attribution of

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<sup>117</sup> See Smith (2010), 163-78.

<sup>118</sup> See Simon (1988), 25-36.

<sup>119</sup> See Simon (1988), 11-25; Blamont (2004), 199.

<sup>120</sup> For two different postmodern critiques to modernity arguing for the positive re-evaluation of the pre-modern paradigm see Milbank (2006); Hedley and Hutton (2008).

<sup>121</sup> See Sorabji (1991); Jacob (2014).

<sup>122</sup> On the quantum properties of light see, at a level understandable to the non-physicist, Walmsley (2015) and the collection of papers in O'Collins and Meyers (2012), 17-100. I have here followed mainly the approach of Polkinghorne (2012).

arrangement and proportion. Through this act of metaphysical decision or measurement the elementary particles acquired their known state.<sup>123</sup> Such a transition from disorder to order through the contemplative act of a divine Creator sounds like an early intimation of the ‘observer effect’ in quantum mechanics according to which the measurement of a system affects its end-state by yielding the knowledge of one and collapsing all other states of being. Of course, the relation of the divine Demiurge to the world was never articulated in quantum terms of an observer–system relation and it would be entirely anachronistic to project quantum mechanics to pre-modern cosmology. But one cannot conceal that, all differences aside, the pre-modern metaphysical intuitions about the structure of physical reality come closer to the post-Einsteinian than the Newtonian paradigm.<sup>124</sup> Why then should we rally unreservedly behind the modern optical paradigm and read the sources through the lenses of a modern concept of ‘objective’ light when contemporary physics has abandoned such a worldview? It is not only the conclusions of the oculo-centric thesis (subordination of light to sight) that do not match the hexaemeral worldview. It is also the modern premises, upon which oculo-centrism builds its argumentation, that are rather unsuitable for the task at hand: they are dated from the point of view of quantum physics and at the same time impervious to the subtle dynamics of pre-modern physics.

The postmodern critique of modernity invites us to re-think the role of vision in the physics of light. Behind the pre-modern optical paradigm lies a basic anthropological insight: we start exploring the world with the senses. The *Timaeus* posits fire and earth as the two fundamental material constituents of the sensible world because they make the world ‘visible and tangible’ (31b4–7). Aristotle in the *De anima* provides an astonishing etymology of the representational faculty of *phantasia*, the outcome of sense perception. It is derived from light (*phaos/phōs*), ‘since sight is sense perception *par excellence*’ and ‘without light it is not possible to see’ (III.3 428b30–429a4). Thereupon, Martha Nussbaum in an influential article has claimed that Aristotle’s ‘account of the faculty of *phantasia* seems to be closely tied to his usage of the verb [*phainesthai* (appear)] and suggests a very general interest in how things in the world appear to living creatures.’<sup>125</sup> We find a similar approach to *phantasia* in the Stoics. Chrysippus, like Aristotle, reportedly derived the etymology of the term from *phōs*, ‘for just as light reveals itself and whatever else it includes in its range, so impression (*phantasia*)

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<sup>123</sup> For such a reading see e.g. Nyssen’s account in the *Apology* (esp. *In Hex.* 7-9 GNO 16.4-19.12, for which see next chapter), full of Timaeian resonances. That early Christian thinkers read *Genesis* and the *Timaeus* ‘in counterpoint’ is a matter of fact. What is debatable is where to draw the line between commonalities and differences, see for two different approaches Pelikan (1997), rather focusing on how early Christians came to the cosmogony of *Genesis* from having read the cosmogony of the *Timaeus*; and Köckert (2009), rather focusing on how the interpretation of *Genesis* and the *Timaeus* produced distinct exegetical traditions, resulting in distinct cosmological projects and schools of thought: the Christian and the Platonist. In my view, the two approaches can be reconciled if we accept that Christian thinkers developed their own reading of the *Timaeus* through the lenses of *Genesis*. I shall substantiate further my suggestion in the following chapters.

<sup>124</sup> Two papers in the aforementioned volume of O’Collins and Meyers (2012) stand out in this respect, suggesting early intimations of post-Einsteinian insights in patristic and medieval thought, see Boyd (2012), esp. 74 (Augustine); Bersanelli (2012), esp. 81-8 (Grosseteste and Dante). The affinity between Grosseteste’s theory of light and post-Einsteinian physics has also been suggested by Mackenzie (1996), 1-5, 79-80, and hinted at by Walmsey (2015), 83-4. All these authors exhibit a vivid and not antiquarian interest in pre-modern theories of light as sources of inspiration for contemporary discussions.

<sup>125</sup> Nussbaum (1978), 222. For the reception and further development of Nussbaum’s view see the discussion in O’Gorman (2005), 18-23, with references.

reveals itself and what produced it.<sup>126</sup> The underlying assumption is that light makes the world visible because light reveals things. The visible world is the world as it appears to the senses understood primarily in terms derived from the experience of sight, the world as a *phainomenon*. The conscious phenomenal experience triggers curiosity and becomes the springboard of all scientific enquiry. Ancient physics begins with an enquiry into the *phainomena*, things as they *appear* to the senses. So does all scientific enquiry, modern physics included.

Scientific enquiry however does not exhaust itself with the realm of appearances. It searches for rational explanations that are by nature of a different order than the phenomena that they explain. The search for rational explanations led the pre-modern mind to the discovery of the noumenal realm of intelligible paradigms and causes. Here too we find a frequent use of the analogy of light, whether in the form of the intelligible sun in Plato's 'sun simile' in the *Republic* (VI 507-9) or Aristotle's adaptation thereof in the analogy of the 'active' intellect with light in the *De anima* (III.5 430a10-7). The idea seems to be the same as before: light's fundamental function is to reveal things. Just as physical light reveals the phenomenal world of change to the senses, so does light's intelligible *analogon* reveal the noumenal world of causal explanations to the intellect. Not only the beginning but also the end of scientific enquiry is, in a sense, 'phenomenological.' We perceive reality physically as it appears to the senses through the sense organs, most notably the eye. And we apprehend reality intellectually as it appears to the intellect through a corresponding receptive faculty, the so-called 'mind's eye' of the Platonists or the 'passive intellect' of the Peripatetic tradition.

The dialectics of the phenomenal world of change with the noumenal world of intelligible causes is also the general framework of hexaemeral epistemology.<sup>127</sup> One can see here a main theme emerging in the hexaemeral literature, a theme that each author will develop more or less independently, a common theme nonetheless. That theme is the celebrated Cosmos-Scripture analogy, which we already saw animating Alexandrian and Cappadocian hexaemeral exegesis. In approaching creation through the *Genesis* text as a narrative, the reader is required to develop a double vision: a retrospective vision of the world as it appears historically, in cosmic time, as we look back; and a prospective vision of the world as it appears literarily, in narrative time, as we read on. It is a double vision of the world as a material and literary *phainomenon*. Hexaemeral hermeneutics is thus visually contingent. But hexaemeral vision is luminocentric, we must never forget, since it is the light that reveals the *phainomena* to the eye – an eye which is itself luminous. With this caveat in mind I am very willing to subscribe to the *ocularism* – though not *oculocentrism* – of the hexaemeral paradigm. But 'ocularism' in this sense will mean no more than a *luminocentric* phenomenal experience of reality.<sup>128</sup>

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<sup>126</sup> Aetius *Placita* IV.12 (900E) = 39B Long/Sedley, from where also the translation, slightly modified. For a survey of the discussion on Stoic *phantasia* see Dinucci (2017) and de Harven (2018).

<sup>127</sup> See paradigmatically Nyssen's *In Hex.* GNO 17.4-9: Moses' purpose (*skopos*) is to lead by the hand those who are enslaved to sensation (*aisthēsis*) through the visible (*phainomena*) to the supra-sensible. Heaven and earth set the limits of all perceptual knowledge (*tōn dia tēs aisthēseōs hemin ginōskomenōn*). Clearly, for Nyssen, 'heaven and earth' in *Gen.* 1:1 fulfil exactly the same phenomenological role and function as 'fire and earth' in *Tim.* 31b4-7.

<sup>128</sup> For a phenomenological approach to ancient theories of light see Vasiliu (1997); Pickstock (2007).



The gradual emergence of the world to the eyes of the reader in and through light is what hexaemeral phenomenality is all about. In narrative time, the *Hexaemeron* takes the form of a revelation. The world appears gradually to the reader, from a state of primordial simplicity ('day one') to a state of complex multiplicity ('day six'). Only the latter state is the world as we know it. To apprehend the primordial unity of 'day one' a *reductio* is needed. '*Hexaemeron*' denotes in this sense a retrograde motion of ascent (or descent) in six contemplative steps, from phenomenal complexity to noumenal simplicity. Take away the steps and all that is left is just another account of the *archē*, a biblical counterpart to ancient cosmogonies, important, maybe, for the history of cosmological speculation, but devoid of theological meaning. The hexaemeral authors transform the perennial search for the *archē* into a performative act of divine pedagogy, a 'spiritual exercise,' to reprise Pierre Hadot, in six retrograde, contemplative steps.<sup>129</sup> The steps give rise to the invert perspectivism of a *phusikē theōria*, the introspective vision of a simple divine presence emerging through the world of the senses. The *Hexaemeron* thus becomes the narrative space of a gradual encounter with the 'mystical,' to rephrase Vladimir Lossky.<sup>130</sup> It is Moses' guide into (and out of) the perplex structure of phenomenal reality. In learning to discern the underlying pattern of creation, its intelligent design – the 'seeds' or imprints of the *Logos* – the contemplative reader is led step by step from the phenomenal world to its noumenal structure. This change in perspective, from the world as it appears to the senses to the world as it appears to the intellect, and back again, is the plan and purpose, the celebrated hermeneutical principles of the 'akolouthia' (sequence) and 'skopos' (purpose),<sup>131</sup> of the Mosaic account of creation. Or so at least is how I suggest that the hexaemeral authors interpreted creation, reshaping hermeneutically a historical account that can be scientifically disproved into an anagogical narrative that is theologically still valid and fertile.<sup>132</sup> The anagogy begins with the kind of light that reveals the *phainomena* to the bodily eye and ends with the kind of light that reveals the *noumena* to the mind's eye. This anagogical theme shapes the contours of the hexaemeral narrative as an intellectual journey from the phenomenal to the noumenal.<sup>133</sup> It is the hexaemeral journey from the physics to the metaphysics of light. The map of this journey is the subject matter of the following sections – a hexaemeral guide for the perplexed. I shall commence with the physics of light.

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<sup>129</sup> On the study of nature as 'spiritual exercise' in the Patristic period see the remarkable paper of Hankey (2013).

<sup>130</sup> On contemplation of nature as part of the 'mystical,' i.e. transformative, experience of the soul see the classical study of Louth (2007), 56-9, 99-100, 104-5. On natural theology as 'integrated into a mystical knowledge of God and of his creation' see Knight (2013), esp. 218.

<sup>131</sup> See on this the landmark studies of Schäublin (1974) and Young (1989), and more recently the magnificent monograph of Young (1997).

<sup>132</sup> This is not an eccentric suggestion. For a similar understanding of the patristic interpretation of nature as theological transformation of the scientific knowledge available at the time see, for example, Nesteruk (2003), 20-1.

<sup>133</sup> To the possible objection that the transformation of the Mosaic account into an anagogical narrative is 'too Platonic' one could answer that the hexaemeral authors also transformed the anagogical theme into a Christocentric narrative, see above (1.III.3). But Cox (2007), has, in my view convincingly, shown that the Christocentric anagogical theme was already anticipated in Middle-Platonism through the role of the *logos* as intermediary principle. Thus, my answer to the possible objection would be that early Christian thinkers saw no discontinuity between their hexaemeral project and the philosophical contemplation of nature. On the contrary, they felt free to build on it, see Gregory Nazianzen *Orat.* 43.11 (*In Laudem Basilii Magni*, PG 36:508-9).



## CHAPTER 2

### The Light of the World: Hexaemeral Physics and Anti-physics

Fire is one of the four elements. It is light and more buoyant than the others, and it both burns and gives light. It was made by the Creator on the first day, for sacred Scripture says: 'And God said: Be light made. And light was made.' According to what some say, fire is the same thing as light. Others speak of the cosmic fire above the air and they call it aether. 'In the beginning,' then, which is to say, on the first day, God made the light to adorn and enhance all visible creation. (John Damascene *On the Orthodox Faith* II.7 tr. Chase)

In the previous chapter, I set out to investigate the hexaemeral physics of light with the aim of retrieving the concept of light underlying the light language of the early church. Before I could examine the source material, however, I had to meet a preliminary objection. The prevalent school of thought in modern historiography contests altogether the possibility of an ancient physics of light, and with it the possibility of a premodern enquiry into the nature of light as an independent agent in the world. Instead, it argues that the study of light was subordinated to the study of sight. The aim of the previous chapter was to take the oculocentric approach seriously, situate it within the hexaemeral literature and assess its cogency. The enquiry did not support the oculocentric hermeneutics, at least as far the hexaemeral literature is concerned. On the contrary, a close study of the sources revealed that the oculocentric interpretation rests upon a subtle but profound misunderstanding. It confounds the *teleological justification* of light, which is indeed conceived anthropocentrically, though biblical exegetes modified ancient anthropocentrism by giving it a Christocentric twist, and the *scientific explanation* of light, which is a proper field of scientific enquiry independent of sight. The confusion obscures the fine but important line that separates the enquiry into the nature of things perceived (physics of light) and the nature of perception (theories of vision). It thus conceals the existence of a proper physics of light in the sources. If my argument is correct, one can do away with the oculocentric objection. The road is now open for a proper investigation into the hexaemeral physics of light. Or is it?

As this chapter begins, we shall see that once the oculocentric objection has been addressed, a new challenge threatens the initial quest. This time, two new sets of objections are raised against the enquiry into the hexaemeral physics of light. Ancient philosophers contested the rational foundations of the creation narrative, and with them the credibility of any project on hexaemeral physics. Modern theologians, on the other hand, contest the *need* for a rational foundation of Scripture altogether, and with it the justification of any hexaemeral physics at all. We thus come to the following picture: while historians of science object to the cogency of a hexaemeral *physics of light*, ancient philosophers and modern theologians object, for different reasons, to the cogency of a *hexaemeral* physics of light. In what follows, I shall attempt to thread the needle by showing how the hexaemeral exegetes defended the project

of biblical physics in general and of physics of light in particular. I shall argue that, from a hexaemeral perspective, the biblical creation narrative entails the guidelines of a scientific framework, which is the particular task of the exegete to retrieve and contextualize in her own intellectual milieu. I shall illustrate how Origen shaped hexaemeral physics through a unique fusion of biblical exegesis with Jewish-Christian apologetics and how later hexaemeral exegetes further developed Origen's project until it reached a culmination point in Cappadocian thought, most notably in the work of Gregory of Nyssa. Once the last sets of objections against the project of a scientifically-based reading of Scripture have been addressed, I shall lay out, with the help of Nyssen, the basic tenet of the hexaemeral physics of light.

## I. Science at the service of Scripture

Any enquiry into the hexaemeral physics of light suggests that there is some scientific framework underlying the biblical creation narrative. Yet, the very suggestion that there is a scientific background to Scripture is itself contentious. Karl Barth, in a famous letter to his niece, decried the comparison between the biblical creation narrative and any particular scientific theory (he had evolutionism in mind) as a category mistake, such that 'there can be as little question of harmony between them as of contradiction.' The biblical interpreter 'should distinguish what is to be distinguished and not shut herself off completely from either side.'<sup>1</sup> Barth's message is clear, expressing the opinion of many contemporary theologians: in dealing with Scripture, one had better keep theology and science apart. There are good reasons for that distinction. The dangers of associating Scripture with a particular scientific worldview have been recently portrayed by John Hedley Brooke in a telling comparison between Augustine's and Thomas Burnet's hexaemeral projects. Burnet

applauded St. Augustine for his warning that science and religion should not be too tightly interlocked, that it was dangerous to invoke the authority of Scripture in disputes about the natural world. The danger as Burnet saw it was this: As scientific understanding advanced, propositions that Scripture had been made to affirm would be proved false. Its authority would then be jeopardized on far more important matters. But, says Burnet with evident condescension, Augustine had fallen into the very trap he had identified. He had used the Bible in his dismissal of inhabitants at the Antipodes. Burnet, so much wiser in the late seventeenth century, is even more aware of the danger and knows how to avoid it.

And yet, anyone reading Burnet's *Sacred Theory of the Earth* (1684) today would be struck by the fact that he falls headlong into the selfsame trap. Instead of keeping the spheres of science and the Bible apart, he brings them together. He offers a mechanistic account of how the Genesis flood had come about, and he defines the main epochs of earth history with reference to information gleaned from his Bible. His picture of a submerged earth, in which Noah's ark is conspicuous, shows how the flood was made constitutive of the earth's physical history. The point of the example is not to score points against Burnet but to raise the more sympathetic question: How was it possible for Augustine to behave in a manner that, to a later generation, looked inconsistent? And similarly for Burnet.<sup>2</sup>

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<sup>1</sup> See Fangmeier and Stoevesandt (1981), 184 (letter 181).

<sup>2</sup> John Brooke (1991), 10.

Brooke's answer to the question has to do with the shifting of the boundaries between 'science' and 'religion' over time, so that Augustine, Burnet and the contemporary reader understand the relation differently. But the point of the critique remains: how can any intelligent reader of Scripture be so short-sighted as to tie down divine revelation, which ought to be by nature universal and diachronic, to any particular scientific and cosmological world-view, which is by nature ephemeral and contingent?

The question is somewhat misleading. It is one thing to acknowledge the connection between Scripture and science and another thing to claim that the connection comes at the cost of the meaning of Scripture. The difference was articulated by one of the most erudite voices in twentieth-century hermeneutics, that of Rudolf Bultmann. Throughout his work, Bultmann acknowledged that the theological meaning of the gospel (the *kerygma*) is delivered in the context of the physical world of the New Testament, the 'mythical' and 'pre-scientific' (as he thought) cosmology of the ancient Jewish and Greek world. Bultmann claimed that the contemporary Christian cannot relate to this ancient mythological framework, nor take it seriously. Contrary to nineteenth-century German theological liberalism, however, Bultmann did not try to eliminate the cosmological element from Scripture. Instead, he tried to make sense of it through interpretation. He thus aimed to uncover the diachronic relevance of the *kerygma* for the human predicament by penetrating Scripture's mythological-cosmological background. He called this process 'demythologising' (*Entmythologisierung*) and found the always relevant meaning of Scripture in its existentialist interpretation.<sup>3</sup> In doing so, he did not aim at vindicating any particular scientific worldview by Scripture. Instead, he aimed at vindicating Scripture from any particular scientific worldview.

The basic premise of Bultmann's 'demythologising' thesis is that Scripture is not born in a scientifically neutral hermeneutical space. On the contrary, the text is embedded in a certain premodern scientific worldview. This is an insight also shared by the early Jewish-Christian hexaemeral exegetes, though they would not follow Bultmann's existentialist reading of Scripture. Hence, the answer of a hexaemeral author to Brooke's criticism would go some but not all the way with Bultmann. In reading Scripture scientifically, the premodern exegete claims to follow Scripture's own hermeneutical premises. In deciphering the scientific background of Scripture and in translating it into his own terms, the hexaemeral author is simply performing, with Bultmann, a premodern 'demythologising' project, translating the meaning of Scripture for a premodern audience. Against Bultmann, however, who is wrestling with the possibilities and limitations of the existentialist philosophy of his time, the Hellenistic and late antique exegete is wrestling with questions arising from a different intellectual milieu, deeply interested in questions of cosmology. What is expected of him is not the dissociation of science from Scripture but exactly the opposite, namely a disquisition on the cosmogenesis from a scriptural perspective. The hexaemeral project aims precisely at that: to put the science of its time at the service of Scripture by actualising, for the contemporary audience, through interpretation, the cosmological framework of the biblical creation narrative. Augustine is only one case of early Christian exegesis putting science at the service of Scripture. Another case is Gregory of Nyssa, whose *Apology to Basil's Hexaemeron* is the

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<sup>3</sup> Bultmann's position, together with a valuable introduction and critical responses, can be found in Bartsch (1953).

most spectacular example of a scientifically informed interpretation of the biblical creation narrative in the early Church.

In the opening paragraphs of the *Apology*, Nyssen informs us that Basil's literal hexaemeral exegesis was motivated by a popularising approach to biblical cosmology reaching out to a large and mixed audience. Nyssen's own project aims to follow the same pattern of biblical exegesis, only adapting it to meet the needs of the erudite. Some of the most difficult issues to tackle were questions pertaining to the celestial physics of light.

But I believe that some have not understood properly the aim (*skopon*) of his [sc. Basil's] work *On the Hexaemeron*. That is why they accuse him of not giving them sufficient information about the sun, namely how the light-bearer is created after three days together with the rest of the heavenly bodies, though it was impossible to separate between morning and evening without the sun's set and rise...

Now, those that bring forward the above and similar accusations have not paid close attention, in my opinion, to the aim (*skopon*) of our father's teaching (*didaskalias*), who was conversing with a large crowd in a church flooded with people and had therefore to adapt his discourse (*logon*) to the needs of his audience. Among so many listeners there were many who had inside knowledge of the advanced teachings (*tōn hupsēloterōn epaiōntes logōn*). But there were even more who could not attain to the subtle investigation of the meanings of Scripture (*tēs leptoteras exetaseōs tōn noēmatōn*), average men and handicraftsmen engaged in manual labour, as well as a multitude of women untrained in this kind of learning (*mathēmatōn*), together with a crowd of children and the elderly. All these needed discourses (*logōn*) that would lead them by the hand from the visible creation (*dia tēs phainomenēs ktiseōs*), and the good in it, to the knowledge of the maker of the All, followed by an understandable pedagogy of the soul (*eulēptou psuchagōgias*). Thus, if we judge the words (*ta legomena*) of our venerable master according to the aim of his teaching (*pros ton scopon tēs didaskalias*), we will find nothing wanting. For he did not set up a polemical discourse (*agōnistikōteron logon*), zealous to wrestle with disputed questions. Instead, his discourse focused on the simpler meaning of the words of Scripture (*tēs haplousteras tōn rhēmatōn exēgeseōs*), with the aim of speaking in a manner suitable to the elementary level of his audience (*tēi aplotēti tōn akouontōn*). At the same time, however, he was lifted up, in a way, in his scriptural exegesis, together with the initiated in greater teachings (*tois tōn meizonōn akroatais*), comparing side by side the interpretation of Scripture with the various teachings of secular philosophy (*ta poikila mathēmata tēs exō philosophias*). As a result, he was understood by the many (*tōn pollōn*) and was admired by the knowledgeable (*tōn huperechontōn*). (*In Hex. 3-4 GNO 8.12-11.2*, my translation)

Who are Basil's accusers? Throughout the treatise they remain anonymous. But that is beside the point. Nyssen is here addressing a wider issue, common in the philosophical discussions of his time. It is the charge of a certain scientific naiveté of the biblical creation narrative.<sup>4</sup> The gauntlet had been eloquently thrown at the feet of any Jewish-Christian exegete a couple of centuries earlier by the Platonist philosopher Celsus. In whatever measure we are able to reconstruct his *True Doctrine* from Origen's monumental response, it is clear that Celsus questioned the rationalistic foundation of the biblical creation narrative. In Origen's words:

Let us also consider the next remarks where he objects to the Mosaic story of the creation of the world with a single bare assertion without even saying anything plausible. *Besides, the cosmogony too is very silly* (*euēthēs*). (*CC VI.49 tr. Chadwick*)

After this he piles up mere assertions about *the different views concerning the origin of the world and of mankind held by some of the ancients whom he has mentioned* and says that *Moses and the prophets*

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<sup>4</sup> On the *Apology* as 'a sample of "Christian science" in answer to the critics who believed Christian theologians to be unable of like exploits' see Costache (2013a), 391. Similarly, Köckert (2009), 401; Gil-Tamayo (2010b), 387.

*who left our books had no idea what the nature of the world and of mankind really is, and put together utter trash (lēros bathus). (CC VI.50 tr. Chadwick)*

After the passage we have examined, as though it were his object to fill his book somehow with lengthy verbosity, he makes a remark which, though in different words, is to the same effect as that which we examined a little above, where he said: *But far more silly (euēthēsteron) is to have allotted certain days to the making of the world before days existed. For when the heaven had not yet been made, or the earth yet fixed, or the sun borne round it, how could days exist?* What difference is there between these words and this remark: *Moreover, taking the question from the beginning, let us consider this. Would it not be absurd for the first and greatest God to command, Let this come into existence, or something else, or that, so that He made so much on one day and again so much more on the second, and so on with the third, fourth, fifth, and sixth?* (CC VI.60 tr. Chadwick; Celsus' text in italics)

The first two passages deliver a clear message: the biblical creation narrative does not even fulfil the minimum standards of a didactic and pedagogically useful myth. The terms used, *euēthēs* and *lēros bathus*, betray a familiarity with various interpretative attempts to read the biblical creation narrative allegorically. Celsus, who is excellently informed about the 'Gnostic' sects, and might have their interpretations in mind, finds fault with the allegorical interpretation of Scripture.<sup>5</sup> He implies, not without some sense of irony, that, at best, the moral or deeper meaning adds nothing new to the current discussion.<sup>6</sup> At worst, it is a very bad example of allegorical interpretation.<sup>7</sup> The third passage expresses the same idea from a hermeneutical perspective. In comparing *Gen. 2:4* with *Gen. 1:1-5*, Celsus spots a series of contradictions in the narrative sequence. They remind us of the charges laid against Basil and reported by Nyssen: does the first day of creation include the creation of heaven and earth (*Gen. 2:4*) or only of light (*Gen. 1:1-5*)? How could heaven and earth be created in the first day (*Gen. 2:4*) when we are previously told that they existed before the first day (*Gen. 1:1-5*)? If the first day of creation occurs with the creation of light (*Gen. 1:1-5*) what kind of day is the one in which heaven and earth were made without the existence of light (*Gen. 2:4*)? The *aporiai* aim to show the apparent incoherence of the scriptural narrative. At stake is, clearly, the coherence (*heirmos*) and narrative sequence (*akolouthia*) of the text.

Celsus' *True Doctrine* was probably written in Alexandria or Rome between 177 and 180 CE. Just a few years earlier, Galen had expressed a similar criticism in his celebrated treatise *On the usefulness of parts*.<sup>8</sup> Written in Rome between 169 and 176 CE, the treatise aims to show that every part of the human body was perfectly designed by divine intelligence to fulfil a

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<sup>5</sup> On Celsus' rejection of the allegorical interpretation of Scripture see CC I.17; IV. 38. Origen responds that in interpreting Scripture allegorically the Christian exegetes do nothing less than what Celsus does with his own religious myths.

<sup>6</sup> Notice the word play: at a surface level, *euēthēs* and *lēros bathus* denote 'silly' and 'utter trash' respectively. On deeper reflection, however, the *eu-ēthēs* is an implied reference to the moral (*ēthos*) sense and the *lēros bathus* to the deeper (*bathus*) sense of Scripture. Celsus is a skilled critic. With his first and second-order use of language he launches a performative attack on the double meaning of Scripture, literal and allegorical.

<sup>7</sup> Origen repeatedly complains that Celsus confuses non-mainstream teachings with mainstream Christian doctrines, see CC V.61-5; VI.24 ff.; VII.25; VIII.15; and Chadwick (1953), xxviii-xxix. We may assume that Origen's substantiated riposte to Celsus' attacks against the allegorical interpretation of the creation narrative would have been along the lines that Celsus confuses 'Gnostic' or other interpretations of Scripture, which Origen also rejects, with orthodox interpretations of the *Genesis* narrative, which Origen follows. Be it as it may, the brute fact remains that Celsus did not substantiate his claim nor Origen his riposte, while the relevant parts of the *Commentary on Genesis*, to which Origen refers the reader, are lost.

<sup>8</sup> Galen's critical stance towards Jewish-Christian creationism has recently attracted the attention of scholars, see Tieleman (2005); Sedley (2007), 241-2. Still fundamental is the work of Walzer (1949).

certain function. The overall point of the treatise is teleological, repeatedly expressed in the adage that ‘nature does nothing in vain.’ It is in this context that the usefulness of such a seemingly insignificant part of the body as the eyelashes is brought up as a polemical example against the materialist account of nature, exemplified in the Epicurean atomism of the time, as well as a more fideistic account of creation, exemplified in the biblical creation narrative.

Has then our Demiurge commanded only these hairs to preserve always the same length and do they preserve it as they have been ordered because they fear their master’s command, or reverence the God who gave this order, or themselves believe it better to do this? Is not this Moses’ way of treating Nature and is it not superior to that of Epicurus? The best way, of course, is to follow neither of these but to maintain like Moses the principle of the Demiurge as the principle (or cause, *archēn*) of generation of all created things, while adding the material principle to it. [...] It was, then, certainly not sufficient merely to will their becoming thus; for had he [sc. the Demiurge] wished to make a man out of a stone in an instant (*exaiphnēs*), it would not have been possible for him either. It is precisely this point in which our own opinion and that of Plato and the other Greeks who follow the right method in science differs from the position taken by Moses. For the latter it seems enough to say that God simply willed the arrangement of matter and instantaneously (*euthus*) it was arranged; for he believes everything to be possible with God, even should he wish to make a bull or a horse out of ashes. We however do not hold this; we say that certain things are impossible by nature and that God does not even attempt such things at all but that he chooses the best out of the possibilities of becoming. (*De usu partium* XI.14 Kühn III.905-6 tr. Tieleman)

In drawing attention to this passage, David Sedley remarks that Galen opposes Moses’ omnipotent God, who was ‘able to create the world and its parts by mere *fiat*, without concern for the properties of mater,’ with Galen’s version of the Platonic Demiurge, who, by contrast, is ‘a craftsman working skilfully *with* the properties of his materials.’<sup>9</sup> Teun Tieleman rightly adds that Galen seems to be an informed critic of Scripture.<sup>10</sup> Tieleman remarks that the possibility of God creating man out of a stone echoes such passages as *Luke* 3:8 and *Matthew* 3:9, with a possible distant echo of the Greek myth of Deucalion and Pyrrha also in the background.<sup>11</sup> From the perspective of an erudite external reader of Scripture like Galen, just like Celsus, the biblical creation narrative situates itself in the realm of the mythical rather than the rational.<sup>12</sup>

Even more interesting is Galen’s polemical suggestion that the biblical creation narrative relies entirely on divine command. The accusation implies more than it explicitly says. First, it insinuates that narrative inconsistencies, like those spotted by Celsus and Basil’s anonymous critics, that introduce paradoxical series of causation, like the effect (e.g. light) preceding its cause (e.g. the sun), can be solved by mere recourse to divine omnipotence. This view is better

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<sup>9</sup> Sedley (2007).

<sup>10</sup> Tieleman (2005), 125. See also the astute remark on pp. 133-4 that Galen is aware of mainstream biblical exegesis interpreting the act of creation as taking place ‘in an instant,’ see Philo *Opif.* 13, 28, 41, 65, 67: *hama, homou, athroa kairōi*; Basil *Hex.* I.6 GNO 11.15-6, 12.1, 12.3-4: *to akariaion kai achronon tēs dēmiourgias, achronōs, athroōs kai en oligōi*; Ambrose *Exam.* I.4.16: *in brevi et in exiguo momento*; Nyssen *In Hex.* 7 GNO 16.4, VIII GNO 17.11, 17.15-9, IX GNO 18.1, 18.9: *homou, athroōs/to athroon/athroa, sullēbdēn, to akares te kai adiataton, en akarei*. Furthermore, Galen’s critique of divine will as the sole ground of creation captures, indeed, the focal point of Christian hexaemeral exegesis after Theophilus of Antioch and Irenaeus of Lyon, see May (1994), 156-78; McFarland (2014), 1-24. Galen seems to be a very well-informed critic of Jewish-Christian hexaemeral exegesis.

<sup>11</sup> Tieleman (2005), 135-6.

<sup>12</sup> On the affinity between Galen’s and Celsus’ arguments see Tieleman (2005), 138-40 (citing *CC* V.14); Chadwick (1953), 375 n. 4 (citing *CC* VI.60, mentioned above).



than atomistic atheism, says Galen, because it recognizes at least God as the efficient cause of creation. From this follow, implicitly, fundamental premises of late antique natural theology, like divine providence and teleology, which are denied by the atomists, but which Galen seems willing to see as operative in Jewish-Christian theism. What is not operative, however, because the recourse to divine omnipotence eliminates its function, is the material principle. That is not to say that the Jewish-Christian exegetes have no role for matter in the world. It only means that they do not have a metaphysically robust account of it.<sup>13</sup> In the reading of the *Timaeus* that Galen is following, mechanical causation (i.e. matter and its properties) is a necessary and independent category of cause.<sup>14</sup> Having no inherent propensity towards the good, it acts in a random and purposeless way until it is guided by divine intelligence towards good ends, within the possibilities and limits of its properties. If, however, the creator is an omnipotent God, like Moses', who can arrange matter in whatever way he wishes (as e.g. in making a bull or a horse out of ashes), there is no need for material causality, or, worse, God is responsible for all the randomness and purposelessness (and hence for evil) in the world. That is clearly a position that no Jewish-Christian thinker can accept. Hence Galen's challenge: either keep divine omnipotence at the cost of making God responsible for the constraints of materiality; or accept the intrinsic limits of matter and its properties and protect divine intelligence from material imperfection. In the background lies, of course, a critique of the doctrine of creation *ex nihilo*, which makes matter entirely dependent on divine will.<sup>15</sup> By overlooking the necessity of mechanical causation in the physical universe the Jewish-Christian thinkers miss something important about the structure and function of the world. That seems to be the deeper point in Galen's critique.<sup>16</sup> Hence the anti-rationalistic charge against Scripture, also shared by Celsus, though in Galen the critique acquires a more appreciative tone as regards God as the efficient cause of the world. Nevertheless, in underestimating the role of the material cause the biblical account of

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<sup>13</sup> In the same way Tieleman (2005), 138: In Galen's view, the Mosaic account of creation 'is defective in regard to causal theory, notably its lacking specification of a rationally acceptable material cause.'

<sup>14</sup> Responsible for imperfection (and evil) in the world, see on this reading of the *Timaeus* Cornford (1997), 161-77.

<sup>15</sup> That is the only point in which I diverge from Tieleman (2005), 135, 143, who does not think that creation *ex nihilo* plays a role in Galen's argument. I think it does, regardless of the precise content of the '*ex nihilo*' in Galen's day: from nothing *in particular*, as seems to be the case in Philo and Justin? or from *absolutely* nothing, as seems to be the case in Tertullian?, see Edwards (2002), 62. The reason for my divergence is that Tieleman, following May (1994), xii-xiii, 8, 148-80, understands the *ex nihilo* only in its 'technical sense,' i.e. in its later Jewish-Christian-Muslim version as creation out of absolutely nothing (pp. 126, 134, 135), while I prefer to keep both options open. Beyond that, I think that Tieleman and I would both agree that creation *ex nihilo* (in all its versions) has divine omnipotence as its ontological foundation (cf. p. 126). Galen is pressing the point that the Demiurge is not unlimited, and hence not truly 'omnipotent,' because he is confined by the conditions of empirical reality. Galen's Demiurge is not free from empirical necessity, as his examples show, see Cornford (1997), 36, 176.

<sup>16</sup> With the caveat just mentioned above, here I develop further the argument of Tieleman (2005), 133-8. If we accept, with Tieleman (p. 133), that 'the basic schema underlying this passage is that of the Platonic *Timaeus* interpreted in terms of the four Aristotelian causes – a reading initiated by Aristotle himself and continued by his associate Theophrastus and others,' we must also accept that in juxtaposing 'the Demiurge as the principle (or cause, *archēn*) of generation of all created things' with 'the material principle,' Galen implicitly concedes that the Mosaic account recognizes three out of four Aristotelian causes, namely the efficient, the formal and the final, while it misses the fourth, namely matter. This is because, according to a unitary reading of the Aristotelian corpus, Aristotle thinks of the three causes (efficient, formal and final) as converging in the Prime Mover, see Bradshaw (2004), 38-44. Our Galenic passage seems to follow that reading as Tieleman (p. 133) rightly perceives.

cosmogogenesis fails to satisfy, in Galen's considered view, the minimum standards of a metaphysically robust theistic account of the world.

I have here mentioned Galen's and Celsus' attacks against the 'logic' of the biblical creation narrative in order to show how different were the challenges faced by the pre-modern scriptural exegete compared to the modern. The twentieth-century theologian had to answer the charges pressed by Harnack, Nietzsche, Heidegger and the like, that Scripture, contaminated allegedly by the categories of Greek philosophy, had become *too rational*. Origen and Nyssen on the other hand had to face the exact opposite charges, laid out by Galen, Celsus and their followers like Porphyry and Julian,<sup>17</sup> that Scripture was *too irrational*. To dissociate Scripture from science or to shift focus from the cosmological to the anthropological dimension, as Barth, Bultmann and their students would have it, would be detrimental to the credibility of the Jewish-Christian faith in the intellectual milieu of late antiquity. It would be like pleading guilty of the charges laid by erudite pagan circles against the credibility of Scripture. That is something that no hexaemeral author was willing to do. We therefore need to realise that the early hexaemeral project was not only exegetical but also apologetic in nature.<sup>18</sup> On the one hand, the hexaemeral exegetes had to distinguish between non-mainstream ('heretical') and mainstream ('orthodox') readings of Scripture, arguing that Galen and Celsus simply had the wrong interpretation in mind – hence the constant guard against deviant readings in the hexaemeral literature.<sup>19</sup> On the other hand, the hexaemeral authors had to vindicate the rationality of the creation narrative, creating space for mechanical causation in their exegesis. If the Jewish-Christian philosophical theology were to be meaningful, it had to argue for the manifestation of divine omnipotence at the level of the material principle. Otherwise the whole arrangement of the world would be completely arbitrary and there would be no metaphysical explanation for the properties of material things other than a supra-rational divine will.<sup>20</sup> The only way of integrating

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<sup>17</sup> See the testimony of Libanius *Orat.* 18 (§178), repeating the common charge against the logic of Scripture as 'ridiculus' (*gelōta*) and 'idle talk' (*phlēnaphon*), with reference to Porphyry's *Contra Christianos* and Julian's *Contra Galileos*. See in detail Meredith (1980), 1119–1149, and briefly O'Brien (2015), 13 (on Julian as the major contender of the Cappadocians).

<sup>18</sup> For example, Philo's *De opificio*, the first extant hexaemeral treatise, opens with an apologetic motif in §§1-3. The apologetic motif runs through the whole treatise and resurfaces clearly at the end in §§170-1, see Runia (2001), 99. The same feature (apologetic motif interwoven with biblical exegesis) is retained in all subsequent hexaemeral works, see e.g. Basil *Hex.* I.1-2; Ambrose *Exam.* I.1-2; Nyssen *In Hex.* 1-4 GNO 5-11, echoing the original Philonic theme. The apologetic motif seems to be present when the exposition is addressed to a wide and mixed audience, comprising non-initiates, starting with Philo's *Exposition of the Law* at the head of which we find the *De Opificio* and going down to all hexaemeral literature with a similar audience. When the audience, however, is a circle of initiates, the apologetic component is no longer necessary, as we can see from Origen's hexaemeral (first) *Homily on Genesis*. I feel that the traditional apologetic dimension of the hexaemeral literature has escaped Doru Costache's learned analysis of Nyssen's *Apology*, which I discuss below.

<sup>19</sup> See Philo: *Opif.* 13, 26-7; *QG* 1.1; *Leg.* 1.20; Basil: *Hex.* II.4, III.9, VIII.1, IX.1; Ambrose: *Exam.* I.8.30, IV.7.32; Chrysostom: *Hom. in Gen.* II.3 PG 53:29d; *Serm. in Gen.* I.1 PG 54:581, I.2 PG 54:583, I.3 PG 54:584, VIII.1 PG 54:617. The tone is already given by Philo who constantly strives for a median line of exegesis, rejecting both extreme literalism and extreme allegorism, see Daniélou (2014), 76-89; Hay (1991), 81-97. The locus classicus is *Migr.* 89-93. The charges of Galen and Celsus against the rationality of Scripture are already anticipated in the Philonic corpus, see e.g. *Conf.* 2, 5, 9 (regarding *Gen.* 9:1-9): hostile critics claim that the Jewish scriptures contain borrowed and foolish myths (*muthous, phrenoblabeia deinē, muthōdes*); *QG* 3:43 (regarding *Gen.* 18:5): uninitiated (*tōn amuētōn*) critics ridicule the biblical account of the change of names.

<sup>20</sup> A thorough discussion of hexaemeral theories of materiality goes beyond the scope of this study. For a way in see for Philo: Sterling (2017), 243-58; for Origen: Edwards (2002), 61-5; for Nyssen: Tollefsen (2010), esp. 175-

material causality in the explanation of the world was by putting the whole philosophical knowledge available at the time, especially cosmology and science, in the service of Scripture. It is the celebrated 'handmaiden' formula, imported and adapted by Philo to fit the demands of scriptural exegesis,<sup>21</sup> reshaped by the Cappadocians into the principle of 'chrēsis' or selective appropriation.<sup>22</sup> Both maxims ('handmaiden' and 'chrēsis') encourage the reader to make use of the best available scientific and other secular knowledge of her time as a necessary condition for penetrating the deeper meaning of Scripture. It is precisely in this context that the ancient physics of light became an indispensable part of the hexaemeral project.

## II. In defence of hexaemeral physics

### 1. Origen and his legacy

A forceful response to Celsus' erudite criticism came, famously, from Origen. In his celebrated apologetic treatise, the *Contra Celsum*, Origen undertook the heroic effort of answering, one by one, all the charges laid against Scripture, including the credibility and rationality of the biblical creation narrative. Origen met Celsus face to face on the dialectical battleground of late antique rhetorical polemics: he reversed the charges by contesting the validity and accuracy of Celsus' own hermeneutical presuppositions. As regards the real meaning of Scripture, however, Origen did not reveal a word more than necessary for his apologetic defence. The reader who was eager to learn more about Origen's hexaemeral exegesis had to look at the (now mostly lost) *Commentary on Genesis*.<sup>23</sup> We find the same method of explicit deferral to the *Commentary* in Origen's other great philosophical treatise, the *De Principiis*.<sup>24</sup> Here, however, Origen was a bit more informative as regards his philosophy of nature, giving us three chapters on corporeality, a chapter on the orderly arrangement of the world and a long section on matter.<sup>25</sup> *Gen. 1:1-2* appears throughout the discussion, showing that Origen never lost sight of the hermeneutical connection. The latter, however, was the focus of the *Commentary*, of which we have only fragmentary and often indirect knowledge. That is the reason why two external pieces of evidence are so important for reconstructing the picture, however partial, of Origen's treatment of the material principle. The first is a fragment from the *Commentary* preserved in Eusebius' *Praeparatio Evangelica*, discussing the craft analogy of the divine Demiurge in conjunction with the question of the pre-existence of matter.<sup>26</sup> The second is a long testimony in Calcidius' section *On Matter (De silva)* from the *Commentary on the Timaeus*, elaborating in detail on the pre-existence of matter.<sup>27</sup> As a

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6; for Basil, Nyssen and their milieu: Sorabji (1988), 44-59. For the theological debate see May (1994); McFarland (2014); and the essays in Burrell, Cogliati, Soskice and Stoeger (2010) and in Anderson and Bockmuehl (2018).

<sup>21</sup> See Philo's treatise *De congressu*, esp. §§73-80; Roskam (2017); Rogers (2014); Sterling (2009); Henrichs (1968).

<sup>22</sup> See Basil's treatise *Ad adulescentes*; Gnllka (1984).

<sup>23</sup> See e.g. CC IV. 37; VI.49; VI.51; VI.60.

<sup>24</sup> See DP I.3.3; II.3.6.

<sup>25</sup> See DP II.1-3; II.9; IV.4.5-8. Add also a couple of scattered but important passages: DP I.4.1; IV.3.15.

<sup>26</sup> PE VII.20.1-9 GCS 402.6-403.18 [=fr. D 3 (Metzler)].

<sup>27</sup> *In Tim.* 276.1-278.16 [=test. C II.1 (Metzler)].

result, we may lament the lost sections of Origen's *Commentary on Genesis*. But we may safely conclude that Origen discussed the role of the material principle extensively and exhaustively, in all likelihood in his exegesis of the first two verses of *Genesis*. Charlotte Köckert has done us an enormous service by studying all the relevant passages and reconstructing, in a coherent narrative, what can be inferred about Origen's doctrine of matter.<sup>28</sup> I will here refrain from repeating that discussion. But I will briefly report on what is necessary, building on Köckert's report, in order to advance my argument. My purpose will be to show how Origen opened the door for a version of material causality, and hence of a proper hexaemeral physics, after Galen's and Celsus' attacks, without compromising divine omnipotence.

From what we may deduce from the existing evidence, Origen counter-attacked his erudite critics by turning their own argument against them. Remember that for those critics, a creationist account based purely on the supposition of divine power and will was not metaphysically solid. Origen undertook to show that it was the other way around. His core idea goes something like this: if matter pre-exists, it imposes external conditions on the exercise of divine will. That undermines the notion of absolute divine freedom, with its correlative of unlimited divine omnipotence and wisdom.<sup>29</sup> Even more crucially, it undermines the coherence of divine creation, making demiurgic divine activity itself contingent on the existence and the properties of a pre-cosmic state-of-affairs, namely matter.<sup>30</sup> If one agrees, however, that only an unconditionally free, omnipotent and extremely skilful Demiurge can also be the absolute foundation of all being, one must further agree that the best way for God to manifest these attributes is for God not only to *arrange* pre-existing materials in the best possible way but to also *create* his own materials.<sup>31</sup> At this point the craft analogy breaks down, because all human craftsmanship is based on materials that are already provided – not so with the divine creator.<sup>32</sup> Origen then retaliates: in making matter dependent on divine will, the Jewish-Christian thinker does not neglect the role of the material principle but puts it in its right place within a theistic framework. In a subtle critique of Galen's own reading of the *Timaeus*, Origen responds that the Demiurge did not work with ready-made materials to mould the universe, but that he selected and created these materials. It is because of the unlimited goodness, freedom and power of divine intelligence that these materials are the best possible.<sup>33</sup>

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<sup>28</sup> See Köckert (2009), 278-93.

<sup>29</sup> Eusebius *PE* VII.20.1.

<sup>30</sup> *PE* VII.20.3-8. What is here at stake, Origen implicitly but unmistakably suggests, is the (so-called 'cosmological') argument for the existence of God (cf. *Laws* X; *Physics* VIII): in order to safeguard unconditional divine freedom, a pre-existent matter would either require the existence of another prime mover, who would be unconstrained, but with a 'third-man' argument (i.e. a *regressio*) hanging in the background, collapsing the entire argument (20.4); or it would result in the break-down of the chain of causality by introducing spontaneity (*automaton*), next to God, as a universal co-explanans of change, annihilating the whole project of ancient creationist physics (20.6). Since neither option is available to a theist philosopher, Christian or pagan, their rejection leads easily to the design argument (20.8). Origen's defence brings the whole philosophical arsenal into play, asking his pagan critics to concede that the acceptance of a pre-existent matter brings down their own theistic premises from within.

<sup>31</sup> *PE* VII.20.2.

<sup>32</sup> *PE* VII.20.9.

<sup>33</sup> As Sedley (2007), 113-27, has recently shown, it is possible to read the *Timaeus* in such a way that the pre-existence of matter does not impede divine freedom, nor is matter the cause of evil. In that reading, the Timaeian Demiurge exhibits his brilliant practical reasoning 'by actually devising the nature of his materials in such a way

It is in this broader context that Origen discusses two views on the nature of the material principle: the view according to which matter is the sum of all (sensible) qualities; and the view according to which matter is the receptacle or material substratum to which qualities are added from without.<sup>34</sup> Both scenarios accept God as the creator of qualities.<sup>35</sup> But that is also to say that God is the creator of the materials of the universe. If indeed all individuated being is qualified being, and the whole is the well-functioning sum of its parts, the universe comes to be through the skilled apportioning of the material qualities.<sup>36</sup> Such an apportioning requires quantification ('measure and number'), giving each quality its shape, place and role in the whole.<sup>37</sup> Thus, the emergence of the cosmos as a functioning whole of well-tuned, qualified and quantified parts manifests the power and practical wisdom – the *logos* – of the divine creator.<sup>38</sup> Origen's response to the erudite critics of his time fully integrates the material principle in the Mosaic account of the cosmogenesis, while at the same time subordinating its role and function to divine power and will. To the subtle attack that in the absence of mechanical causation there is no room for hexaemeral physics, Origen can now give an even subtler response: divine will is the power upon which hinges all scientific explanation of the world.<sup>39</sup> To the further possible objection that Origen has, in this way, denigrated matter from the role of a 'cause' to a mere 'enabling condition,' making mechanical causation entirely dependent on divine power and will and depriving the material principle of any independent metaphysical existence of its own, the Alexandrian was not left defenceless. He could respond that the whole purpose of materiality was to enable the manifestation of divine will and power in spatio-temporal terms, communicating the fullness of divine benevolence to rational agents, according to the measure of their ability to grasp it. Origen's answer to the erudite critics of his time gives shape to the fundamental maxims of all subsequent hexaemeral exegesis: the world is a theophany; creation is contemplation.

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as to maximize their regularity and causal dependability in achieving his goals' (p. 118). That the divine Demiurge selected and shaped his materials is a doctrine also shared by Galen, see Tieleman (2005), 131, 134. A comparison between Sedley's and Galen's reading of the *Timaeus* and Origen's reading of *Genesis* 1 reveals that we stand in front of a dialectical argument about the best version of the same doctrine. If that is so, Origen actually argues that Moses expressed better what Plato and his followers had in mind. It is the so-called 'theft of philosophy argument,' going back to Aristobulus (fr.3) and early Jewish-Alexandrian apologetics, claiming that Greeks stole philosophy from the Jews, see Sterling (2014).

<sup>34</sup> See *DP* IV.4.7. As Edwards (2002), 62-3 rightly observes, these scenarios were not Origen's inventions but reported by him. That means that the 'idealist' theory of matter (first scenario) pre-exists Origen, hence also his younger contemporary Plotinus and the later Nyssen too, who are usually considered as the first pagan and Christian expounders of idealist metaphysics respectively, see Sorabji (1988), 44-59.

<sup>35</sup> Expressly so for the first scenario in *DP* IV.4.7; implied through the statement that 'omnia, quae sunt, a deo facta esse' for the second scenario, see *DP* IV.4.8 GCS 359.9.

<sup>36</sup> See *DP* IV.4.8 GCS 360.10-361.2.

<sup>37</sup> See *DP* II.9.1; IV.4.8 GCS 359.14-5: *Fecit autem omnia numero et mensura; nihil enim deo vel sine fine vel sine mensura est*. Origen is reading *Wis.* 11:20 in light of *Tim.* 53b4-5 (or, to be more precise, vice versa). On the Demiurge as a good apportioner see *DP* II.9.6.

<sup>38</sup> See *DP* IV.4.8 359.20: *Virtute enim sua omnia conpraehendit*; 360.10-11: *Omnis igitur creatura intra certum apud eum numerum mensuramque distinguitur*. That this is the work of Wisdom or *logos* is clear from *DP* I.2.3 GCS 30.10-12: [...] *species scilicet in se et rationes totius praeformans et continens creaturae: hoc modo etiam verbum dei eam [sc. sapientiam] esse intellegendum est*. See further Eusebius *PE* VII 20.8: *tōi technitēi logōi theou*.

<sup>39</sup> This is the foundation of Origen's *logos*-doctrine, see *DP* I.2.9-10.

To the educated reader, the discussion evokes an ambivalence as regards the place of matter in Platonic metaphysics. While Socrates in the *Phaedo* excluded material causation altogether, classifying the matter involved in a causal process as a necessary condition instead of a 'cause' (99a4-b6), Plato in the *Timaeus* reinstated matter in the class of causes, identifying *Phaedo's* necessary conditions as secondary, 'auxiliary causes' (46c7, d1, e7). To put it simply: If Platonizing critics of Scripture like Galen and Celsus could invoke the Timaeian metaphysics of matter to attack the hexaemeral narrative, Origen could appeal to the metaphysics of the *Phaedo* to score a point from within the same school of thought.<sup>40</sup> If my argument is correct, Origen had produced a tremendous defence of hexaemeral physics. In arguing that divine omnipotence manifests in and through the material world, Origen had saved the hexaemeral physics from its critics, allowing for a scientific explanation of the world.<sup>41</sup> The only condition was for the scientist to realize that the role of all enquiry into nature was to lead the enquiring mind anagogically from the study of the natural world to the study of its divine cause. But that is *phusikē theōria*, the very essence of the hexaemeral project, as we saw in the previous chapter. In subordinating materiality to the divine will, Origen had turned physics into the threshold of hexaemeral hermeneutics. It was Gregory of Nyssa who, in the late fourth century context of post-Nicaean orthodoxy, would creatively appropriate the most of Origen's physical thought. In his *Apology on the Hexaemeron*, Nyssen would reiterate the basic tracks of Origenian thought and spell out the consequences for the hexaemeral physics of light. It is to Nyssen, then, that I shall now turn.

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<sup>40</sup> The ambivalence concerning the classification of the matter involved in a causal process as a (secondary) 'cause' continues in Plato's later works. Thus, the terminology of primary and secondary 'causes' is reprised in the *Statesman* (281c-282a) as regards productive arts and activities, while in the *Laws* (896a-897b) Plato seems to reserve the term 'cause' only for the activity of soul (896d5-8), speaking merely of secondary, material-bodily 'motions,' not 'causes' (897a4-5), questioning even the appropriateness of the notion of 'secondary' as regards their role in change (896b4-8), apparently because bodies do not seem to originally produce motion but only transmit it from one to another (896b4-6). In the latter view, soul is the ruling principle (i.e. the mover) while body is what is ruled (i.e. moved, 896c2-3). The question then seems open for debate from within the Platonic corpus itself. For the hexaemeral tradition, it was Philo who first denied the status of a 'cause' to matter, see Runia (1986), 143-4, 454-5; Runia (2001), 115-6 (remarks on *Opif.* §8), and now the paper of Sterling (2017), 243-57. Origen, here, is clearly developing a Philonic position.

<sup>41</sup> To be absolutely clear, I am not suggesting, here, that Origen was the first to produce a hexaemeral physics or include elements of physics in his hexaemeral exegesis. That would be a grave misunderstanding of the preceding and parallel tradition, cf. Philo's *De opificio* and Theophilus' *Ad Autolyicum* II.11-9. I am merely suggesting that Origen was the first to respond to philosophical attacks against the coherence of a notion of hexaemeral physics (and hence of a scientific explanation of the biblical world) if material causality is rejected and divine benevolence and omnipotence are accepted as the sole causes of materiality. This does not exclude a further layer of argumentation in which Origen would be answering to previous critics by making recourse to the new interpretation of creation *ex nihilo* as creation from *absolutely* nothing, if we accept, with Tieleman and May, that this development was not available at the time of Celsus and Galen, see my discussion above (2.1). In my view, however, Origen's doctrine of a *creatio aeterna*, for which see Bostock (2007), 222-7, allows for both interpretations of the creation *ex nihilo*, as creation from nothing *in particular* and *absolutely* nothing, a point that Gregory of Nyssa will spell out later through his substratum and idealist theory of matter respectively, for which see right below. For this reason, I do not think that we can make sense of the hexaemeral physics focusing only on the question of the creation of matter. The latter approach would be rather one-sided, leaving big questions open as regards the metaphysics of Origen and Nyssen. In my view, the real (and intellectually stimulating) point of controversy was about the ontological status of matter as a 'cause' or not. Only after this status had been effectively denied, could one argue for a creation out of nothing other than the power of God, regardless of how one would exactly understand that 'nothing.'

## 2. Introducing Nyssen's *Apology*

Nyssen's *Apology* is, in many respects, a riddle. It has attracted the attention of some of the greatest patristic scholars and yet the work itself, its genre, its purpose and its place in patristic literature, if not also the content, remain obscure. The obscurity goes a long way back. Just about a generation after the work was written, the church historian Socrates made a brief remark in his annotated chronicle stating that, after Basil's death, Gregory 'completed Basil's *Hexaemeron*, which had been left unfinished.'<sup>42</sup> It is customary to think that Socrates here alludes to the *Apology*.<sup>43</sup> Under this assumption, however, lies a confusion between Nyssen's two works: the *De opificio hominis*, which was written with the explicit purpose of fulfilling Basil's promise of a further discourse on the creation of humankind;<sup>44</sup> and the subsequent *Apologia in Hexaemeron*, whose purpose was not to continue Basil's project, which had just been completed with the *Opificio hominis*, but to expand on it. Nyssen set himself a new aim in the *Apology*: to answer several objections raised against Basil's literal interpretation of the scriptural narrative by exploring the inner structure (the *akolouthia*) of creation.<sup>45</sup> Going back to Socrates' statement, we may observe that the passage quoted refers only to the *Opificio hominis*, the only supplement to Basil's *Hexaemeron*, while the *Apology*, the defence and expansion, is not mentioned at all. Socrates is an early witness to the fact that the *Apology* has often, though not always, been overshadowed by the influence of the *Opificio hominis* in the reception history.<sup>46</sup> It will be the future task of the historian to distinguish between the influence of Nyssen's two hexaemeral works in the patristic literature.<sup>47</sup>

In current scholarship, the *Apology* has had a fascinating but turbulent career. For Karl Gronau it was important to argue, against Nyssen's explicit intentions, that the *Apology* is a continuation and, in some respects, the culmination of Basil's hexaemeral project.<sup>48</sup> This gave further support to Gronau's thesis that Posidonius' (alleged) *Commentary on the Timaeus* was the common source behind late antique biblical and Platonic exegesis. Gronau's position was

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<sup>42</sup> Socrates, *Hist. Eccles.* IV.26.27 GCS 262.20-21.

<sup>43</sup> See e.g. Risch (1999), 1.

<sup>44</sup> See Basil *Hex.* IX.6 GCS 160.14-5; Nyssen *Opif. hom.* Preface, 1-2 Forbes 104 (=PG 44:125C). See also above (1.III.3).

<sup>45</sup> See *In Hex.* 6 GNO 14.9-12; 77 GNO 83.10-84.14.

<sup>46</sup> For example, according to O'Meara (1998), 76, 78, 'Eriugena's use of Gregory of Nyssa is confined to the *De opificio hominis*.' But Eriugena's remark in *Periphyseon* I.521a27 on 'the nature of light, which is fire' (*naturam lucis quae est ignis*) cannot be derived directly either from Basil's *Hexaemeron* or from Dionysius' *Celestial Hierarchy*, which are mentioned by Eriugena in this context, nor from Nyssen's *Opif. hom.*, but only through a reading of Basil's *Hexaemeron* through Nyssen's *Apology*. Other example: Grosseteste, *In Hexaemeron*, I.XVI.3, refers to a view attributed to Josephus, Nyssen and other anonymous hexaemeral commentators, according to which, contrary to the standard interpretation of Jerome, Strabus, Bede, John Damascene and Basil, the firmament of the second day is the same as the heaven of the first day. In his annotated translation, Martin (1996), 74 n. 4, mentions as Grosseteste's source the first chapter of Nyssen's *Opif. hom.*, which offers a recapitulation of the creation narrative from *Gen.* 1:1 to 1:26. But there is no discussion there of the relation of the 'firmament' [*Gen.* 1:6] to 'heaven' [*Gen.* 1:1], even less an allusion to their identification, nor anywhere else in the *Opif. hom.*, as far as I can tell. The only source that Grosseteste could derive that information from Nyssen is through some reading of the *Apology*.

<sup>47</sup> For a detailed discussion of the influence of the *Apology* in the reception history and contemporary scholarship see Risch (1999), 46-52.

<sup>48</sup> See Gronau (1914), 5.

later attacked from multiple sides.<sup>49</sup> As regards the method of ‘source hunting’ (*Quellenforschung*) underlying Gronau’s work, the majority of English-speaking scholars gradually contested and eventually abandoned the ‘Posidonian frenzy’ that marked the first half of the twentieth century, rendering Gronau’s argument dated.<sup>50</sup> Gronau’s particular reading of Nyssen was also attacked by E. Corsini who, in an influential article, suggested that Nyssen only pretended to clarify Basil’s positions further, while in reality he promoted a different, personal agenda.<sup>51</sup> For Corsini, Basil and Nyssen could not have used the same original source, disproving Gronau’s Posidonius-thesis.<sup>52</sup>

In the subsequent discussion, scholars have often followed Gronau’s or Corsini’s argument, with certain modifications, especially as regards the Posidonius-thesis.<sup>53</sup> Peter Bouteneff, for example, adopts the continuity argument, according to which the *Apology* and the *De opificio* elaborate or complete Basil’s hexaemeral homilies.<sup>54</sup> For Bouteneff, the *Apology* is intended for a different audience from Basil’s, allowing Nyssen to use ‘a more technical and scientific level of discourse.’<sup>55</sup> At the same time, the *Apology* builds on ideas already present, even if only latent, in Basil’s work, like the simultaneity (*athroon*) and sequential order (*akolouthia*) of creation or the double aspect of creation (intelligible and sensible).<sup>56</sup> Doru Costache, on the other hand, follows the discontinuity argument, contesting that the real intention behind the *Apology* was to defend or expand Basil’s *Hexaemeron*.<sup>57</sup> Instead, Nyssen ‘used *Genesis* as a pretext for his own discourse.’<sup>58</sup> Nyssen’s real purpose was twofold: to assert his own scholarly standing against the memory of his brother and to bridge the scriptural and the scientific worldviews, showing that the biblical worldview could raise a respectable voice in the scientific and cosmological debates of the time. Costache therefore challenges the established view of the *Apology* as an exegetical work, arguing that it mainly serves an apologetic purpose.<sup>59</sup>

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<sup>49</sup> See Gronau (1914), 112-141.

<sup>50</sup> For the changing of the tide in Posidonian scholarship see the ground-breaking paper of Edelstein (1936), 286-325; for the current, much more balanced assessment on Posidonius’ influence see Dilllon (1996), 106-113; on the hypothesis of a Posidonian *Commentary on the Timaeus*, which was the foundation of Gronau’s thesis, see Kidd (1988), 337-343, esp. 339: there is no sure evidence that Posidonius wrote a separate commentary on the *Timaeus*, nor that he did not. Hence Kidd classifies the much-debated fr.85, which is the main textual evidence of a direct Posidenian exegesis of the *Timaeus*, under the dubia. Gronau’s thesis, however, continues to be popular in German scholarship, see Risch (1999), 52-55.

<sup>51</sup> See Corsini (1957).

<sup>52</sup> Corsini’s conclusion is that Basil and Nyssen drew independently from many sources, like Cicero, Philo, Seneca, Posidonius, Panaetius etc., with the use of multiple doxographic sources and scholastic handbooks as most probable (pp. 102-3).

<sup>53</sup> For an overview see Risch (1999), 1-2, 52-55: though the importance of Posidonius is not contested in its entirety, he is no longer regarded as the ur-source of hexaemeral literature.

<sup>54</sup> Bouteneff (2008), 154.

<sup>55</sup> Bouteneff (2008), 155.

<sup>56</sup> Bouteneff (2008), 155-6.

<sup>57</sup> See Costache (2013a), esp. 378-83, with the explicit adherence to Corsini’s view on p. 382. The view was developed further in Costache (2013c).

<sup>58</sup> Costache (2013a), 386.

<sup>59</sup> Costache (2013a), 383-91; (2013c), 1-7.



The examples aim to show that the interpretation of the *Apology* is still open to debate.<sup>60</sup> In Bouteneff's words: 'It is, in many respects, a puzzling text.'<sup>61</sup> In the limited scope of the current chapter, I cannot begin to do justice to the complexity of the questions raised in the text. On the other hand, I cannot afford to ignore its unique importance for the discussion of hexaemeral physics. Taking stock of the different approaches to the *Apology*, there is at least one thing that seems common to all: the central role of material causality, with a special focus on light, whether in the context of the discussion of the nature of the heavenly bodies (Gronau), the doctrine of universal conflagration (Corsini), the theory of the four elements with its direct bearing on fire, light and water (Bouteneff) or Nyssen's aim to bridge the Christian and the scientific world view (Costache). I shall therefore only approach the text from a specific viewpoint, that of the hexaemeral physics of light, fully aware that in skipping over several interpretative difficulties my treatment may seem provocative, inadequate, or both. For the purposes of my discussion, I shall treat the *Apology* as a *philosophical commentary* on the biblical creation narrative, building on Basil's homilies and continuing Origen's apologetic agenda.<sup>62</sup> But first a note on the overall plan, aim and structure of the treatise.

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<sup>60</sup> Corsini's key argument that Nyssen's *Apology* contradicts Basil's *Hexaemeron* has been recently heavily criticised by Risch (1999), 5-9, 54-55. But Corsini's argument is also the foundation of Costache's reading of the *Apology*. Similarly, Costache's emphasis on Nyssen's scientific agenda has been anticipated and called into question by Risch (1999), 50-1 (discussing earlier German scholarship). Conversely, Risch (1999), 55, is much more positive to the idea of a Posidonian influence than most English-speaking scholars would allow. Meanwhile, O'Brien (2015) and DeMarco (2013) have expressed intermediate positions. They both acknowledge the continuity between Basil's and Nyssen's hexaemeral projects, but they also affirm the divergence as regards the interpretation of the upper waters. I express my own opinion in the next chapter (3.1.3).

<sup>61</sup> Bouteneff (2008), 154.

<sup>62</sup> Though a proper discussion exceeds the scope of this chapter, let me say, at least, why I suggest the solution of a philosophical commentary. Convincing as I find Costache's arguments on the apologetic nature of the treatise to be, it is not clear to me why he excludes the possibility of an exegetical commentary also serving an apologetic purpose, as is the case of Philo's *De officio*, or of an apologetic treatise also having exegetical value, as is the case of Theophilus' *Ad Autolyicum* (Book 2). In my view, there is ample evidence to suggest that the *Apology* combines material from (and the style of) the biblical commentary tradition on *Genesis* and the commentary tradition of the schools on the *Timaeus*. Gronau (1914), 114-5, is still helpful in this respect because he shows that Nyssen's views on material causality come very close to Calcidius' *Commentary on the Timaeus*, while Alexandre (1976), 178-80, has suggested Origen's *Commentary on Genesis* as the common influence behind the corresponding passages in Nyssen and Calcidius. For this reason, I propose to take seriously Nyssen's own remarks about the nature of his treatise (*In Hex.* 6 GNO 13.7-4.12), namely that it is modelled after a school exercise (*ōs en gymnasīōi tini scholastikōs*) which proceeds argumentatively (*eggumnazein tēn dianoian*), investigating the 'grammar' of creation (*sunērtēmenēn tina kai akolouthon theōrian*) without raising any doctrinal claims of an *authoritative* exegesis (*ou didaskalian exēgētikēn*). See for a similar interpretation Köckert (2009), 400-6, esp. 405-6. In my view, the *Apology* is nothing short of a *diatribē* on *Genesis* 1. It stems from Nyssen's own meditation on creation, his *phusikē theōria*. This allows for Costache's emphasis on the apologetic component, next to the exegetical component recognized by the prevalent view, see e.g. Alexandre (1971); Simonetti (2010), 331. Nyssen's constant emphasis on the *akolouthia* of the scriptural text is, in my view, the ultimate argument in favour of the *Apology's* undeniable exegetical character. And again, the emphasis on the *akolouthia*, *skopos* and *dianoia* of the text, rather than the *lexis*, proves that Nyssen's exegesis is philosophical rather than philological. For these reasons I fully concur with the discussion and assessment of Risch (1999), 1-11, 49: the *Apology* is at the same time an exegetical, apologetic and philosophical work. In what follows, I will not question further the exegetical character of the *Apology*.

### 3. Approaching nature through the lens of Scripture: Physics as hermeneutics

The *Apology* opens up with a series of questions addressed to Nyssen by his younger brother Peter, the later bishop of Sebastia, triggered by Basil's literal hexaemeral exegesis. Here is a synoptic overview of the questions asked: 1) if the revolution of the sun is the cause of day and night, and the sun is created on the fourth day, how is it possible to speak of three preceding days (and nights); 2) if the creation narrative refers to only two heavens (*Gen.* 1:1 and 1:8), why does Paul introduce a third (2 Cor. 12:2); 3) if God commanded the creation of light (*Gen.* 1:3), how did darkness exist without a divine command; 4) building on (1), if the presence of light is enough to account for the change of day and night, why did God create the sun; 5) if 'creation' (*poiēsis*) and 'formation' (*kataskeuē*) denote the same thing, how is it possible that the earth which was 'created' (*Gen.* 1:1) in the beginning together with the heaven is nevertheless 'unformed' (*Gen.* 1:2a); 6) assuming, with Basil, that the 'waters' of *Gen.* 1:7 refer to physical water, how is it possible for water to remain on top of the circular and rotating heavens without falling; 7) if heavenly fire is constantly nourished by vaporized water, as Basil suggests following the Stoic theory of exhalations, how is it possible for the mass of fire and water in the universe to remain the same without the one element devouring the other?<sup>63</sup> The questions raise objections similar to those put forward by Celsus and Galen against the 'logic' of the biblical creation narrative.<sup>64</sup> They bring to surface logical contradictions that arise from the literal reading of *Genesis*. In other words, they contest the coherence (*heirmos*) and consistency (*akolouthia*) of the scriptural text. At the same time, they question the existence of mechanical causation: if there is light, days and nights without the sun, why would the world need a sun at all? If the sun is the cause of day and night, how can there be three days before the sun comes to existence? and so on. It is precisely the kind of inconsistency that Augustine wrestles with in his *Commentary ad litteram*, constantly making the reader aware of the tremendous challenge of a purely literal reading of the biblical creation narrative.<sup>65</sup> From Origen to Augustine, the hexaemeral exegetes strive to come up

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<sup>63</sup> See *In Hex* 3 GNO 8.12-9.15 and 5 GNO 11.8-12.22.

<sup>64</sup> The objections are already an ancient problem by the time of Nyssen, going at least as back as Hellenistic Judaism, see Kugel (1998), 72, with reference to *Jubilees* 2:2 and the Qumran *Hymn to the Creator* 11QPs<sup>a</sup>. Nevertheless, the charges were continuously reprised and actualised in different subsequent intellectual contexts, as the examples of Galen and Celsus show. In the second half of the fourth century the charges were more or less emphatically repeated by Julian (see above, this chapter under section I). That is not to say that Peter serves as a pagan mouthpiece. Augustine's ambivalent stance towards the literal reading of *Genesis* 1 (for which see the next note) shows that Peter articulates genuine *aporiai* from within mainstream Christian theological circles as to whether Basil's project represents the best exegetical strategy in addressing the issue. Nyssen's defence aims to satisfy a twofold audience: Christian sceptics and non-Christian critics.

<sup>65</sup> See e.g. *Comm. ad litteram* I 12.24-5: how there was light and darkness before the luminaries during the first three days; 15.31: a physical explanation of the first three days and nights: contraction and emission of light; 17.32-5: a spiritual interpretation of the first three days and nights according to the letter: distinction and ordered succession of things; 19.38-9: the spiritual interpretation of *Genesis* does not preclude a parallel literal interpretation; II 1.1-4: how there can be waters above the sky; 4.7-8: Basil's interpretation of the waters above the heavens; 13.26-7: how the first three days passed before the luminaries were made, etc. The comparison of Cappadocian with Augustinian hexaemeral exegesis is instructive. Augustine's (finished) *Comm. ad litteram* is admittedly more aporetic than affirmative in nature (see *Retractiones* II.24) and his suggested interpretation is not strictly speaking 'literal' but 'according to the letter,' constantly opening up to a spiritual reading, see e.g. I.3.7: the light of *Gen.* 1:3 is the spiritual light of creation. Moreover, in the *Retractiones* I.18.1, Augustine admits the gigantic challenge of a purely historical reading of the creation narrative. This shows that Basil's and Nyssen's literal interpretation of *Genesis* represented an apogee of the hexaemeral tradition of the early Church.

with a convincing answer to the problems posed by the letter of the scriptural text. Nyssen's questions epitomize these problems.<sup>66</sup> Interestingly, four out of the seven *aporias* (five, if we consider heaven as the luminous space *par excellence*) concern the biblical physics of light.

The questions are exegetically formulated, subordinating the hexaemeral physics to the needs of scriptural interpretation. Nyssen's answers follow the opposite pattern, subordinating the *aporiai* to the physics of the creation narrative. The questions are answered not in the order they are asked, but in the order that the cosmogony unfolds.<sup>67</sup> This reveals the inner structure of the treatise. The *Apology* is a reflection on nature, or, if you like, a disquisition on materiality, starting with the question of matter (§§ 7-9), continuing with that of the physical elements (§§ 10-27), their generation and corruption, with an emphasis on the circle of water (§§ 28-63), moving on to the heavenly bodies (§§ 64-74), and finishing up with the vision of Paul's third heaven (§§ 75-6). A proem (§§ 1-6) and an epilogue (§§ 77-8) contextualize Nyssen's discourse within the hermeneutical framework of questions and answers based on Basil's hexaemeral homilies.<sup>68</sup> As Risch has convincingly shown, we stand in front of a bottom up contemplation of nature (*phusikē theōria*), starting with the densest form of materiality, namely earth, and moving upwards, through water and air, to the finest forms of corporeal existence, namely the fiery planets and stars of the ethereal and sidereal region, until we reach the highest heaven, Paul's paradise. Risch rightly sees in this ascending motion of the intellect, from earth to heavenly fire and beyond, an early intimation of Nyssen's signature idea of *epektasis*, the constant stretching and perpetual progress of the soul. It is the idea animating the structure of Nyssen's response.<sup>69</sup>

The juxtaposition between Peter's questions, which are based on the scriptural text, and Nyssen's answers, which are based on his contemplation of nature, creates a chiasm running like a thread through the whole treatise. As the reader goes back and forth trying to match each question with its appropriate answer, what emerges is the idea of *narrative logic* as the guiding principle of interpretation, manifested further in the hermeneutical subprinciples of coherence (*heirmos*), consistency (*akolouthia*) and overall structure (*taxis*) of the text, revealing its aim or purpose (*skopos*).<sup>70</sup> In placing the narrative logic – or the 'grammar of creation' – between the text and the world, Nyssen suggests that the key to a comprehensive contemplation of nature is, essentially, hermeneutical. I want to take some liberty in reconstructing this aspect of Nyssen's thought, because some of it belongs to the subtext of the *Apology*. After all, this is a philosophical treatise addressed to erudite readers. Nyssen's aim is to prompt his readers to think. His argument goes something like this: from a non-

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Today we are unaware of this hermeneutical achievement because we are accustomed to thinking that the literal reading is the most obvious approach to a text. If I am right, however, in late antiquity the literal reading was the least obvious approach to a sacred text, or at least not so obvious as it is today. On the lost deeper meaning of Scripture see the seminal study of Louth (1983), esp. 96-131.

<sup>66</sup> See Risch (1999), 6: The questions were not invented by Peter but appear again and again in hexaemeral exegesis. They predate Basil.

<sup>67</sup> See Risch (1999), 22-3.

<sup>68</sup> I here follow the analysis of Risch (1999), 16-20.

<sup>69</sup> See Risch (1999), 23-4. As becomes clear from §76, which contains the vocabulary of *epektasis*, the contemplation does not stop at the boundaries of the physical world but stretches beyond, entering the intelligible realm, Paul's third heaven. See also 5 GNO 12.22-13.6 with a rather didactic suggestion as to how Peter would achieve real *epektasis*.

<sup>70</sup> See *In Hex.* 4-6 (*skopos, akolouthia, to akolouthon*); 9 (*heirmos, taxis, akolouthia, to akolouthon*).

theistic perspective, we cannot find any rhyme or reason in nature – it is all a product of *tuchē* (luck).<sup>71</sup> In order for a philosophical investigation in nature to be conclusive, we need to adopt a theistic framework (cf. ‘cosmological proof’). That was Moses’ great insight on the Mountain.<sup>72</sup> In order to help his readers find their way through the chaotic phenomena of the world, Moses wrote down the key in the form of a creation narrative.<sup>73</sup> The key to the narrative is the idea of a necessary order (*akolouthia*) revealed in the six ‘days,’ i.e. the six stages or episodes of creation – the ‘hexaemeron.’<sup>74</sup> The *aporiai* that emerge from the text only make us think harder on the meaning of *akolouthia* and how it applies to nature.<sup>75</sup> That is Moses’ guide to the perplexed. In approaching nature through the prism of Scripture, we approach the world as a coherent whole that has a beginning, a middle and an end, serving a certain purpose. In other words, we unlock the meaning of nature by reflecting on the *heirmos*, the *akolouthia* and the *taxis* of the universe.<sup>76</sup> Nyssen argues that the same hermeneutical principles apply to the interpretation of Scripture and the interpretation of the world.<sup>77</sup> For Nyssen, then, we are hermeneutically contingent creatures. We make sense of

<sup>71</sup> See *In Hex.* 9 GNO 19.5-6; 17 GNO 29.12-7, which reprises the traditional hexaemeral attack against materialism, identified at the time with Epicurean atomism, see Basil *Hex.* I.1 and I.7, and the comments of Risch (1999), 148-50 n.123 and 176 ns188-90.

<sup>72</sup> See the references to Moses’ contemplation of nature (§ 1) and philosophical ascent on the mountain (§ 5). The allusion to the ‘cosmological proof’ (or rather the theistic framework of contemplating nature, which, philosophically speaking, presupposes some version of the cosmological argument, e.g. of the sort we find in *Laws X* or *Physics VIII*) is made through the reference to Basil’s first hexaemeral homily (I.1) and, much later, through Nyssen’s own explanation of Moses’ life, see e.g. *Vita Mosis* II.25, 152-61. Nyssen informs his readers multiple times that the hexaemeral contemplation of nature is a philosophical one: *tōn en tēi kosmogoneiai philosophēthentōn* (1 GNO 6.1-2; 6 GNO 13.13-4); *pefilosophēmenōn* (1 GNO 6.8-9); *dia tēs hypselēs philosophias* (1 GNO 7.2-3).

<sup>73</sup> See *In Hex.* 8 GNO 17.2-6.

<sup>74</sup> On the principle of *akolouthia* see the magisterial essay of Daniélou (1953) still setting the tone. See also the excellent treatment of the subject in the introductory notes of Norris (2012), xxxviii-xliv, and pp. xxix-xxxviii on the *Skopos*. For the current state of discussion see Gil-Tamayo (2010a). As Daniélou has shown, *akolouthia* is a word with a fluid range of meanings, denoting literally ‘what follows’ or ‘what comes next,’ always in the sense of necessary and progressive correlations between the parts of a well-ordered and coherent whole. It is thus usually translated as ‘sequence,’ ‘series’ or ‘succession.’ Another possible range of meanings is that of ‘connection,’ ‘junction,’ ‘coordination,’ ‘concatenation.’ It is closely connected to the terms *heirmos* (literally ‘chain’) and *taxis* (lit. ‘order’), together with which it denotes the inner coherence, consistency and well-ordered structure of a whole (e.g. a speech, a text, an argument, an artistic creation, or even nature). From the point of view of hermeneutics, the term denotes the unfolding of the different episodes of a narrative, revealing a systematic and methodological unfolding of the plot. The term goes back to Stoic logic (though Nyssen mentions it in an Aristotelian context at least once, see *C. Eun.* I.46 GNO 37.19-38.2) but its use in a hexaemeral (i.e. both cosmological and hermeneutical) context is undoubtedly Philonian, see *Opif.* 28: ‘Order (*taxis*) is a sequence (*akolouthia*) and series (*heirmos*) of things that precede and follow, if not in the completed products (*apotelesmasin*), then certainly in the conceptions (*epinoiais*) of the builders’ [tr. Runia with the helpful comment in (2001), *ad loc* (p. 160)]. I here refrained from translating the term unilaterally in order to capture something of its extremely nuanced and versatile use by Nyssen.

<sup>75</sup> See *In Hex.* 1 GNO 6.4-5 (*dia tinos akolouthou dianoias eis heirmon agagein*).

<sup>76</sup> See e.g. *In Hex* 5 GNO 11.8-9 (*tēn anagkaian tēs ktiseōs taxin*); 6 GNO 14.11-2 (*akolouthon en tēi ktisei tōn gegonotōn epinoēsai tēn theōrian*); 9 GNO 18.16 (*heirmos tis anagkaios kata tina taxin*); 9 GNO 19.7 (*hē anagkaia tēs phuseōs taxis*); 77 GNO 83.14-5 (*tō tēs phuseōs heirmō*).

<sup>77</sup> See *In Hex.* 6 GNO 14.10-12: Nyssen enquires ‘whether it is possible for us, with God’s help, to keep the letter of the text as it is (*menousēs tēs lexeōs epi tēs idias emphaseōs*) and along with it, following its sequence (*sunērtēmenēn tina kai akolouthon*), contemplate the events of creation (*en tēi ktisei tōn gegonotōn epinoēsai tēn theōrian*).’ The answer is affirmative: everything was brought to completion by a certain necessary *heirmos* (pattern) according to a certain *taxis* (order), ‘...not by haphazard chance (*ouk automatōi tini suntuchia*), appearing randomly and without order, but following a sequence (*to akolouthon*) as the necessary order of

material phenomena by interpreting them. And we learn the principles of interpretation by reading Scripture, wrestling with the question of meaning. To speak of ‘creation’ is to already look upon the world from a certain viewpoint. It is the viewpoint – viz. the *theōria* – that Moses acquired when he looked at the world from the top of Mount Sinai.<sup>78</sup>

I have dwelt a bit longer on the overall plan and purpose, the *akolouthia* and *skopos*, of the *Apology* because they hold the key to Nyssen’s approach to hexaemeral physics. At the heart of the issue lies the question of materiality. We are entering here a much-disputed terrain of Nyssen studies and it is not my intention to reprise the whole discussion.<sup>79</sup> But it is important to acquire a taste, at least, of how Nyssen deals with the most fundamental question of hexaemeral physics. Remember that Origen reported two different views on matter, a bundle theory and a substratum theory, as alternative metaphysical possibilities. Nyssen builds on Origen’s exegetical strategy by restating both models (idealist and substratum), yet with a subtle nuance that appears to disturb the exegetical balance. For Origen the two theories were derived from two different exegetical traditions, not raising any claim to being consistent with each other. With Nyssen the two theories become part of the same unified exegesis of the creation narrative.<sup>80</sup> This raises the issue of compatibility.<sup>81</sup> Some of the best Nyssen scholars see an unsolvable difficulty here: if matter is the substratum that *receives* qualities, it cannot be that matter *is* the sum of all qualities.<sup>82</sup> It seems, however, that there is more to Nyssen’s dialectical strategy than first meets the eye. For Nyssen does not try to fuse the two parallel doxographies into one, suggesting that matter is both the substratum *and* the concurrence of qualities in one and the same respect. Instead, he takes great care to distinguish between the two models as two different angles from which one could approach the question of materiality.<sup>83</sup> In one respect, matter can be theorized as the simultaneous

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nature (*hē anagkaia tēs phuseōs taxis*) requires of everything that partakes of becoming. This is how Moses said that everything was made, expounding in narrative structure the doctrines of natural philosophy (*en diēgēseōs eidei peri tōn phusikōn dogmatōn philosophēsas*).’ It is precisely this chain of natural causality that the narrative structure of the biblical creation narrative mirrors (77 GNO 83.14-5). Contemplation of nature goes hand in hand (*sunagoreuein*) with contemplation of Scripture (77 GNO 84.10-4).

<sup>78</sup> For Sinai as the symbolic mountain of knowledge of God see *Vita Mosis* II.152, 158. For the use of the metaphor in the *Apology* see 5 GNO 11.5-10. Moses’ ascent becomes the symbolic expression of the ladder of knowledge of the philosophers. It is the ascent of the intellect from perceptual to intelligible reality, working its way upwards from the sensible realm to the intelligible and from one *proximum movens* to the next until it reaches the divine prime mover. The chain of causality that leads to the prime mover is the *heirmos* and the movement along the chain of causation is the *akolouthia* of nature. The suggestion is that contemplation of nature, and hence the whole plan of the *Apology*, is a meditation repeating the stages of the argument for the existence of God. We are at the heart of the early Christian natural theology.

<sup>79</sup> For an informed overview of the *status questionis* see Costache (2013c), 14-27.

<sup>80</sup> See *In Hex.* 7 GNO 16.4-11 (idealist theory); 16-7 GNO 27.10-29.11 (substratum theory). The first model is developed as part of the exegesis of *Gen.* 1:1, the second as part of the exegesis of *Gen.* 1:2a. The transition from the one model to the other is made in 16 GNO 26.14-27.9 through a brief recapitulation of the exegesis of *Gen.* 1:1 before proceeding to *Gen.* 1:2a.

<sup>81</sup> The question has triggered the seminal paper by Alexandre (1976), 159-86.

<sup>82</sup> See Alexandre (1976), 184-6; Köckert (2009), 432-6, 433: ‘Der Widerspruch [...] lässt sich nicht auflösen.’

<sup>83</sup> Nyssen’s dual aspect epistemology is certainly not innovative, see already Philo’s *Opif.* 13, 28, 67, and the comments of Runia (2001), *ad loc.* *Sub specie aeternitatis*, everything was created simultaneously; *sub specie temporis*, however, creation is envisaged as an ordered sequence of events. For Nyssen’s adaptation of the same exegetical motif, see Costache (2013c), 22-7 (‘creation as one event and as a series of events’). In my reading, however, Nyssen goes a step further in directly connecting this dual aspect epistemology with the theory of matter. Köckert (2009), 433-6, 437-8, comes extremely close to my reading by distinguishing between two aspects of creation, *sub specie dei*, i.e. from the perspective of the intelligible substance (*ousia* or *physis*) of

(*homou*) concurrence (*sundromē*) of certain conceptual ingredients: 1) pairs of opposite qualities, such as heaviness and lightness, rareness and denseness, softness and hardness, wetness and dryness, coldness and hotness; 2) special sensibles, like colour; 3) common sensibles, like shape and outline (*tēn perigraphēn*)<sup>84</sup>; and 4) interval or extension (*to diastēma*). These are the materials that God produced in order to bring material existence instantaneously into being (*sullēbdēn ho theos en akarei katebaletō*).<sup>85</sup> In another respect, however, matter can be theorized as the substratum (*hupokeimenon*) that receives the qualities, being itself devoid of any particular or determinate quality.<sup>86</sup> It is difficult to understand exactly why this dual approach has caused so much controversy and misunderstanding in Nyssen scholarship. It only takes a simple look just a bit outside of the *Apology* to realize that the two approaches go a long way back to the interpretative tradition of the *Timaeus* and are commonly discussed in the relevant philosophical literature.<sup>87</sup> If nothing else, the alleged ambiguity is already found in Aristotle's discussion of Plato's receptacle.<sup>88</sup> Basil himself alludes at least twice to this discussion but does not want to enter

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things, and *sub specie silvae*, i.e. from the perspective of material bodies (*hulē*), attributing to them, correctly, two different modes of temporality (*homou* and *to akolouthon*). But she insists that the two aspects address two different questions (p. 433). I here argue that they address the same question, namely the question of materiality.

<sup>84</sup> Retaining with Forbes the mathematical notion of *perigraphēn* (circumscription, outline, surface) instead of Drobner's *epigraphēn* (inscription, name, description), which makes little sense in this context.

<sup>85</sup> See *In Hex.* 7-9 GNO 16.4-18.13 and 16 GNO 26.14-27.10.

<sup>86</sup> See *In Hex.* 16-7 GNO 27.10-29.16, esp. 17 GNO 29.1-6.

<sup>87</sup> For the ancient debates see Sorabji (1988), chs 1-3 (substratum theory) and ch. 4 (idealist or 'bundle' theory).

<sup>88</sup> See e.g. GC II.1: no substratum separate from the elements, and yet there is a substratum separable from them in thought, without which we could not account for the inter-transformations of the elements. The ambiguity is solved by a dual perspective already in Aristotelian scholarship, see e.g. Lloyd (1968), 168: 'Quality-less matter [...] is an abstraction: although logically matter can be imagined without qualities of any sort, in fact it never exists in such a form. The building-blocks from which other material objects are constructed are the four simple bodies.' Hence the dual approach in the subsequent discussion, a nice summary of which can be found in Calcidius *In Tim.* 302-4, distinguishing between two forms of reasoning: the way of analysis or abstraction (*resolutio*), leading to the apprehension of matter as substratum devoid of qualities, and the way of synthesis (*compositio*), approaching matter from an idealist perspective, corresponding to Nyssen's 'bundle' theory. Calcidius does not claim that this dual-aspect theory is his, but attributes it to the Platonists (§302). He also provides the common ground of both views: matter is deprived of qualities not in the sense that it can ever exist independently but in the sense that forms and qualities are not part of matter's proper nature (§310). The two approaches help illustrate matter's peculiar nature, namely that it is neither corporeal (§319 approaching matter as substratum) nor incorporeal (§320 approaching matter as bundle of properties: *silva formata qualitibus, quantitibus etiam figurisque*). Calcidius' conclusion that matter is 'neither corporeal nor incorporeal but both body in potency and non-body in potency' (§320 tr. Magee) corresponds, in my view, to Nyssen's statement that the earth in *Gen.* 1:2a 'was and was not' (16 GNO 27.15-6: *ēn kai ouk ēn*). It is surprising that Calcidius' report has escaped proper attention in scholarship, with the notable exception of Gronau, *Genesisexegetese*, 113-5 (but again with no discussion of the dual approach). The silence is even more remarkable since Alexandre discusses extensively the relevant part of the *De silva*, see Alexandre (1976), 178-9, focusing, however, only on the 'way of analysis,' (p. 166 n. 12). Van Winden (1965), has rendered an enormous service by systematising the *De silva* and tracing its sources. But he seems to have also missed the dual approach to matter and the presence of an idealist theory, as is visible from his translation of the aforementioned passage in § 320 (*ad loc* p. 166): 'matter, provided with qualities, quantities and figures,' which is better than Magee's 'informed.' But once we accept that the idealist theory is a theoretical option available at the time, *silva formata qualitibus* means exactly what it says: matter *formed, produced or constituted* by qualities. A much shorter report of the dual approach is also found in Plotinus *Enn.* II.4.14.17-28 (matter as privation and matter as substratum), as the product of Peripatetic thought, see the comments of Kalligas (2004), *ad loc* (p. 324). In light of this evidence, Nyssen's dual approach to the question of materiality is much less innovative than it seems. Why such a big fuss about it, remains to me an incomprehensible mystery.

into details which he finds unhelpful for the needs of the mixed audience that he is addressing.<sup>89</sup> But he does suggest a starting point, namely that materiality is a compound of form (viz. qualities) and matter, and opens up two ways of unpacking the metaphysical implications. In the exegesis of *Gen. 1:1*, he approaches the question of materiality by the way of analysis or abstraction (*hekastēn tōn enuparxousōn tēi phusei idiotētōn hupexaireisthai tōi logōi*), which results in the elimination of the substratum (*ouden estai to hupokeimenon*).<sup>90</sup> Conversely, in his exegesis of *Gen. 1:2a*, he approaches the question of materiality from the reverse perspective, as a synthesis of form (*morphē*) and matter (*hulē*), a view that presupposes matter as a substratum devoid of qualities (*hupokeimenon chōris morphēs*). He also stresses that God created matter (*hulēn*) together with the forms (*tōi eidei sunapegennēse*), while he conceived substance (*ousian*) through the forms (*tōi eidei suneilēmnenēn*).<sup>91</sup> Nyssen's audience is different, and this gives him the chance to elaborate on what was only hinted at by Basil. Following his brother, Nyssen develops the idealist theory for the purposes of the exegesis of *Gen. 1:1*, while he elaborates on the substratum theory for the purposes of the exegesis of *Gen. 1:2a*. If there is a tension between the two theories, then it is already present in Basil. Nyssen simply tries to provide a rational explanation of how the *hupokeimenon* can be at the same time a nothing (*ouden*) and yet one of the two components of materiality (*eidos* and *hulē*). He thus comes up with the ingenious suggestion that the first two verses of *Genesis* describe two different approaches to the world. The idealist model approaches creation *sub specie dei* (*tōi theiōi ophthalmōi*), showing that the materialization of qualities, which *per se* are mere thoughts and concepts (*kath' eauta ennoiai eisi psilai kai noēmata*), necessary entails a mode of being *other* than God. This is because a material mode of being requires a conceptual space other than God who is immaterial (*aülos*).<sup>92</sup> The second model, which now reprises the narrative *sub specie mundi*, makes

<sup>89</sup> See *Hex. I.8* GCS 14.12-15.15 and II.2-3 GCS 23.6-25.18.

<sup>90</sup> See *Hex. I.8* GCS 15.3-12. The underlying idea is the following: if something (a *tode ti*) is a composite of *eidos* and *hulē* [see *Hex. II.3* GCS 25.12-7, following the standard analysis of Aristotle e.g. in *Metaph. Z.3* (1029a2-7)] then it is self-evident that neither of the two components can, by and of itself, be a 'something.' Basil spells this out as regards matter: it is not-a-thing (*ouden*). Nyssen spells out the other half of the equation: neither are qualities *per se* a something; they are mere thoughts and concepts (*ennoiai eisi psilai kai noēmata*).

<sup>91</sup> *Tōi eidei tēn harmozousan hulēn sunapegennēse*: dative of association following a verb with a *sun-*prefix meaning 'together with.' But *autēn tēn ousian tōi eidei suneilēmnenēn*: Giet, *Hexaéméron*, 149, translates once more as a dative of association ('leur substance et leur forme tout ensemble'). But for the meaning 'together with' one would need here a syntax such as *meta tou eidous* or *sun tōi eidei* or *kai to eidos*. Instead we get a dative of instrument: the substance is conceived by God through/by the form, a clear allusion to the doctrine of *Metaph. Z.7-9* that the substance of a thing (and the moving cause of its coming to be) is the form, which in artistic production is found in the soul of the artisan, here God.

<sup>92</sup> See 7 GNO 16.5: God *kateballeto* the intelligible ingredients of the material world. *Kataballō* means 'lay down, deposit, put in, sow,' clearly employing a spatial metaphor. The 'space' that is here implied cannot be physical place or mathematical space, since interval or extension (*diastēma*) figures among the ingredients that God *kateballeto*. If place and space are ruled out, *kateballeto* can only mean a kind of 'conceptual space' as a metaphor for a different mode of being, as von Balthasar (1995), 29-30 and 47-8, rightly seems to have thought (though confusingly also identified with 'space and time,' causing a lot of objections, see Alexandre (1976), 184-5; Köckert (2009), 432). Later treatments of Nyssen's *diastēma* have not helped clarify that dimensionality and space-time are the mere consequences of 'otherness' and logically posterior to it, as Plotinus rightly remarks, see *Enn. II.4.12.11-3*. What Nyssen here presupposes is spelled out in *Enn. II.4.5.28-31*: otherness as prior to (and productive of) matter. Plotinus speaks in this context of intelligible matter (while the consequences for sensible objects are discussed in *Enn. II.4.16*) and Nyssen gives us a clue that he is indeed thinking in similar terms. The ingredients of the world are, *per se*, intelligible (*ennoiai eisi psilai kai noēmata*).

explicit what was previously implicit.<sup>93</sup> It elaborates on the conceptual space ‘in which’ creation occurs, namely the substratum (*hupokeimenon*), showing, however, that it is not a physical but a metaphysical enabling condition, a state of potentiality (*dunamei to einai eiche*). The transition from potential to actualized being (*energeiai*) is achieved by the concurrence of qualities, described as a process of ‘thickening’ or solidification (*puknōsis*). Clearly, the two models approach the question of materiality from two different, but, at the time of Nyssen, convergent philosophical languages, the Timaeian language of space (*chōra*) and the Aristotelian language of potentiality (*dunamei*).<sup>94</sup> The two are combined in the formula of matter as a *chōrētikē dunamis*.<sup>95</sup> Once the language is understood, we can better appreciate Nyssen’s intentions. The dual approach to matter goes back directly to the *Timaeus*: an account of creation from the point of view of the Intellect (29d7-47e2), approaching the body of the cosmos as materialization of qualities or powers (31b4-32c4); and an account of the world from the point of view of Necessity (47e3-69a5), positing a substratum for the material manifestation of qualities to occur (49a6-50b5). Nyssen’s two models, the idealist and the substratum, correspond to the work of the Intellect and the work of Necessity, respectively,<sup>96</sup> betraying a close engagement with Timaeian physics in the subtext of the *Apology*.<sup>97</sup> But Nyssen learns to read the *Timaeus* through Origen. As we saw, even a Platonist like Galen would go as far as to accept that the Demiurge shaped the materials out of which he moulded the world. But he would still think of matter as a cause. That is where Nyssen uses Origen’s corrective. First, the idealist theory clearly denies the causal role of matter in creation (since matter does not exist *per se*). Secondly, the substratum theory ascribes an enabling role of matter in creation (since the materialization of qualities requires the *possibility* of a mode of being other than God). Nyssen sides decisively with

<sup>93</sup> *Sub specie mundi*, since the exegesis has now moved from *Gen. 1:1 (sub specie dei)* to *Gen. 1:2a*, starting with the unformed earth, which I take as an exemplary case of unformed matter, following the Philonian-Origenian tradition (but avoiding the blunt identification, against which Basil had protested in *Hex. II.2*, as too suggestive of the uncreated matter of the schools), see Gronau (1914), 115-6 n.2 and Alexandre (1976), 172-80. Risch (1999), 175 n.184 and Köckert (2009), 430, rightly protest that Nyssen refers here only to the unformed state of ‘earth’ as one of the four elements and not to ‘unformed matter.’ The latter view, however, overlooks the fact that the earth functions here as a case study. The discussion is about the materiality of the world, not just earth, see 16 GNO 27.7-9: the exegesis of *Gen. 1:2a* helps illustrate the creation of the whole universe (*tēs hulikēs tou pantos kosmou katabolēs*). The emergence of the element ‘earth’ (*tēs geōdous poiōtētos*) is part of the exegesis of *Gen. 1:9-10*, i.e. of the third day of creation, which is the subject matter of §26.

<sup>94</sup> On the history of this convergence I found very helpful the comments of Runia (1986), 141-5; and Fleet (1995), 164-7.

<sup>95</sup> See *In Hex. 17* GNO 29.6-10: *chōrētikēn tōn poiōtētōn dunamin; dektikēn dunamin tōn poiōtētōn* (the power to receive qualities).

<sup>96</sup> Another possibility would be to suggest that Nyssen’s two models correspond to the two ways of thinking about the Receptacle, namely as a neutral ‘stuff’ and a space or place, reiterating an ambiguity inherent in the *Timaeus* itself, see Zeyl (2000), lxii-lxiv. But, as already explained, Nyssen’s first theoretical construction cannot mean mathematical space or physical place. Having said that, Nyssen could of course re-interpret the Receptacle as ‘conceptual space’ but to do so he would need to argue top down, i.e. from the point of view of the Intellect. Hence my solution.

<sup>97</sup> The *Timaeus* contains also a third part, referring to the combined work of Intellect and Necessity, which explains the formation of the human being as a psychophysical living organism (69a6-92c9). In my reading of Nyssen, the *Opif. hom.* treats the same subject matter as the third part of the *Timaeus* (namely the combined work of Intellect and Necessity exemplified in the human being as a psychosomatic entity), while the *Apology* treats the same subject matter as the first two parts (namely the work of the Intellect and the work of Necessity). If I am right, the *Apology* and the *Opif. hom.* contain, *together*, Nyssen’s Christianized version of the whole program of the *Timaeus*. This might go some way to explain why the *Apology* and the *Opif. hom.* have been so often treated indiscriminately in the reception history.



Origen against Galen, arguing that matter is not a cause but only an enabling condition of the phenomenal world. The whole of creation, including matter, is the work of divine will, power and wisdom.<sup>98</sup> That is the whole point of Nyssen's theory of matter and at least on this everybody seems to agree.<sup>99</sup>

We are back, then, to Galen's objection: if creation is grounded in divine omnipotence, what is the role of the material principle? Can there be a coherent notion of hexaemeral physics? We saw how Origen answered the question by denying the status of a cause to the material principle but fully integrating it as an enabling cause for the divine will, power and wisdom to manifest. This is where Nyssen picks up the thread. The whole point of the *Apology* is to show how divine will, power and wisdom manifest in the world as the creative *logos*, God's practical reasoning, so to speak.<sup>100</sup> It is through the *logos* that God separates (*diakrisis*) each element from an indeterminate conglomeration of properties, allowing it to manifest distinguishable, quantifiable and regular characteristics, accountable for the appearance of sensible qualities.<sup>101</sup> And it is through the *logos* that God combines (*sundromē*) the qualities in such proportion and measure as to allow particular beings to emerge.<sup>102</sup> Phenomenal being is actualised being; actualised being is individuated being; and individuated being is qualified being, i.e. a *tode ti* emerging, gradually, out of an initial panspermia of indeterminate properties according to an innate *logos*. It is this *logos* that bestows order, causality and regularity to the natural phenomena. Conversely, it is the study of the regular, causal and structured patterns of nature that reveals the presence of an *egkeimenos* (i.e. innate) *logos* at work.<sup>103</sup> That seems to be the result of Nyssen's contemplation of nature.

If I am right, the story of creation is, for Nyssen, the story of the self-disclosure of the *logos*. Scripture and nature become the receptacle of the *logos* in its dual aspect, as speech and as reason.<sup>104</sup> Hence the fusion of physics with hermeneutics in the *Apology* – a purely Origenian

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<sup>98</sup> See *In Hex.* 7 GNO 14.13-15.8; 9 GNO 18.7-19.15.

<sup>99</sup> See Costache (2013c), 14, 17, with references.

<sup>100</sup> See *In Hex.* 10 GNO 20.17-21.6 and 11 GNO 22.5: Everything was created according to the *logos* of God's wisdom (*kata ton tēs sophias logon; pan to ginomenon logōi ginetai*); creation manifests God's wisdom as *logos* (*hē en tēi ktisei theōroumenē sophia logos esti*). Nyssen describes creation with the help of a craft analogy, see 10 GNO 21.15 (*technikēs theōrias*). Hence, God's creative *logos* reveals the skill of the divine craftsman to give material shape to his thought, see e.g. 10 GNO 21.5-6 (*logon tina sophon kai technikon*). Nyssen uses also the biological analogy of the seed (*spermatikē dunamis* 16 GNO 26.13-4), which is another popular image of the creative power of the *logos* inherent in nature, see Köckert (2009), 461-81, and Köckert (2010), 27-32. On the role of the *logos* in Nyssen's doctrine of creation see Mateo-Seco (2010), esp. 184; Costache (2013c), 21-2.

<sup>101</sup> On the *Apology* as a form of the so-called 'diakrisis-cosmogony,' see Spoerri (1959), 76-7; Risch (1999), 34-6; Köckert (2009), 461-5. That the separation (*diakrisis*) of elements is the particular work of the *logos* is exemplified in the case of light, see §§10, 12, 72 and 74.

<sup>102</sup> Nyssen describes the emergence of the phenomenal world of change as a continuous process of combination and separation of elements, see *In Hex.* 53 GNO 63.18-64.2: *panta en allēlois esti kai di' allēlōn diakekritai*. On the combination of qualities according to the *logos* of each thing compare the two passages on materiality, 7 GNO 16.4-11 (*sundramonta pros allēla*) and 17 GNO 29.1-6 (*kata ton logon*). On *sundromē* see the detailed comments of Risch (1999), 124-5 (n. 84) and 133-6 (n. 97).

<sup>103</sup> See *In Hex.* 10 GNO 21.5-6: *chrē hekastōi tōn ontōn kai logon tina sophon kai technikon egkeisthai pisteuein*; 11 GNO 21.8-9, 26 GNO 40.7: *ton egkeimenon [tēs phuseōs] tēi ktisei logon*.

<sup>104</sup> See *In Hex.* 10-11 GNO 20.71-22.14: The works of God's creative *logos* (*ho kata ton tēs sophias logon egeneto*) are described by Moses as words of divine commandment (*hōs logos theou prostaktikos emnēmoneuthē*). They are the divine *fiats* of the creation narrative (*ta prostaktika tēs tōn ontōn ktiseōs rhēmata*). Hence, the *works* of

insight: it is the same *heirmos*, *akolouthia* and *taxis* that disclose the indwelling *logos* of the world, whether in the literary world of Scripture or the physical world of nature. The contemplation of the emergent *logos* becomes the deeper insight driving Nyssen's work, the real *skopos* of the *Apology*. It is here, at the level of the *logos*, both cosmic and literary, that Nyssen defends Basil's hexaemeral project. The vision of creation as the manifestation of the creative *logos*, of God's practical wisdom revealing itself through the works that it creates, allows Nyssen to answer Basil's critics and defend, at the same time, Basil's affiliation with the Origenian agenda.<sup>105</sup> The detractors were not able to see past the method and grasp the deeper unity and continuity in Origen's and Basil's hexaemeral exegesis: the world as a theophany; creation as contemplation of the divine *logos* at work. Nyssen's defence is beautiful but has the major disadvantage of being elusive, due to the nature of the vision that it aims to capture. It is the vision of a paradoxical *logos*, divine and yet in the world, always hidden and yet always present, showing itself in the reflection of the works that it creates.<sup>106</sup> It is the mystery of this *logos* that Moses sets out to narrate, not by saying the unsayable – an

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creation are the words of creation (*to ergon logos esti*) revealing the *logos* at work in creation (*pan to ginomenon logōi ginetai*).

<sup>105</sup> See Basil *Hex.* I.7 GCS 12.6-13.11 (craft analogy): God as *technitēs*, the world as a *techinon kataskeuasma*, bearing in it the *technikos logos* of the divine craftsman. I.8 GCS 15.3-12 (*a contrario*): the rational investigation (*tois logismois, tōi logōi*) into individual substances (*tēn ousian*) leads to the *logos* of their nature (*tōi tēs phuseōs logōi*) and the accidental qualities that complement it (*sumplērōtika tēs ousias, enuparchousōn poiōtētōn*). II.2 GCS 23.6-25.8: corrective to the craft analogy, which, if understood anthropomorphically, leads to the erroneous postulation of an uncreated matter. Instead, God created both matter and form and shaped the elements of the world as was required by their individual *logos* (*hōs ho hekastou logos apēitei*); God then bound together all the different (*anomoioimerē*) parts of the world into a harmonious whole through a friendly bond (*philia thesmōi*). This is, as Callahan (1958), 46, rightly perceived, a clear allusion to the composition of the world's body according to *Tim.* 31b4-32c4. There we learn that the harmonious bond (*desmos*) of the world is a *logos* in the mathematical sense of (geometric) proportionality (*analogia*). III.2 GCS 40.7-41.6: the divine *fiats* reveal the creative intent (*boulēma*) and innate propensity (*hormē*) of God to be the divine *logos* (*logos tou theou*). The creative activity of God is a purely intelligible motion (*noerou kinēmatos*) communicated to the *logos* as the co-author of creation (*sunergou*), in a purely intelligible fashion (*tou noēmatos koinōnein; tōn en kardia noēmatōn hē metadosis*). III.10 GCS 55.7-20 (continuation of the craft analogy): in the eyes of God (*ophthalmois theou*), the goodness of creation is measured by the *logos* of the creative art (*tōi logōi tēs technēs*). God moulded together the individual parts of the world through his creative *logoi* (*tois technikois heautou logois*), like a skilled artist (*technitēs*). V.4 GCS 74.22: every created being realizes a particular *logos* (*idion tina logon*) in creation. V.2 GCS 70.20-71.21: the species (*genos*) of plants is in their seed (*sperma*) or their innate seminal power (*spermatikēn dunamin*). VII.2 GCS 114.4-7 (seminal causes): the biological image of the seed applied by analogy to animal species (*hoinei spermata tina tēs phuseōs*); etc. Compare now Origen's *Hom. in Gen.* I.1: The '*in principio*' of *Gen.* 1:1 means that God made heaven and earth '*in uerbo suo*,' i.e. in the *logos* of *John* 1:1. See also my references above on the role of divine wisdom and *logos* in Origen's doctrine of creation. The deeper point of the *Apology* is to show that the doctrine of the *logos* is the crucial link between the Origenian and the Basilian hexaemeral exegesis. Once the continuity of the *logos*-doctrine is established, all differences in hermeneutical method and details are revealed for what they are, namely exegetical variations on the same theme: creation as the *topos* of incarnation, i.e. self-manifestation, of the divine *logos*. The assumption is of course that Origen and Basil share the same doctrine of the *logos*. The proof for that can be found in the christological conclusions of Basil's final homily, referring to the Son in the characteristically Origenian (and originally Philonian, see *Opif.* 25; *Fug.* 101) language of the *logos* as the image (*eikōn*) of the Father, cf. *Hex.* IX.6 and *DP* I.2. It is exactly at this point that Nyssen picks up the thread of the hexaemeral narrative from Basil, first to complete the work of the *logos* with the creation of humankind (*De Opificio*) and then to clarify further its cosmic significance (*Apology*).

<sup>106</sup> See *In Hex.* 7 GNO 22.15-23.17: *kata ton arrēton tēs dunameōs logon*. Notice the paradox: *arrētos logos* denotes both 'unspeakable speech' and 'irrational ratio,' thus surpassing all human understanding (*pasan ennoian pariōn anthrōpinēn*).

impossible task – but by following its trace in the *taxis* and *akolouthia* of the world.<sup>107</sup> It is this *akolouthia* that the creation narrative retells in six episodes, the ‘six days.’ Moses guises in narrative form the key to nature’s deepest secret, to the hidden *logos* of things, turning physics into hermeneutics. *Akolouthia* and *hexaemeron* thus become terms co-extensive in meaning: they both tell the story of the universe as the unfolding of the *logos*, creation as the divine workshop, the world as revelation of the divine craftsman’s ineffable skill. The first act of the revelation of the *logos* is also the first speech-act of creation: ‘let there be light.’<sup>108</sup>

### III. Enter light

#### 1. A look behind the scenes: The hexaemeral theory of change

There is a certain Heraclitean flair in Nyssen’s doctrine of the *egkeimenos logos* that loves to hide. Consider the first divine *fiat*: God said ‘Let there be light’ and there was light. No matter how many times we read the verse, we are merely spectators of the end product, the outcome of God’s creative activity. There is nothing in the text about the creative process itself, nothing about the preparatory work that the craftsman has to do in order to bring light into existence. The workshop of creation, the divine mind where all the planning and shaping of the world is done, remains forever hidden behind the lines of the creation narrative. To reprise a celebrated metaphor: if creation is a cosmic drama, we only get to see what moves on stage. If we want to learn how everything was prepared, however, we have to lift the curtain and take a look behind the scenes. In identifying the *logos* of nature with the *logos* of Scripture, Nyssen cannot be more explicit: The hexaemeral *logos* is of a Heraclitean breed. To those who fail to grasp the message, Nyssen sends the signal out twice. The *Apology* begins with Moses leaving the crowd behind, entering the cloud of knowledge alone, and ends with Paul leaving the sensible world behind, entering the third heaven. Both images use mystical language, inviting Peter, together with the able reader, to follow Moses and Paul, lift the veil of phenomenality and take a look at the adytum.<sup>109</sup> It is there, behind the scenes, that the immanent *logos* of things abides. And it is the task of the hexaemeral exegete to retrieve this *logos* from the subtext of the creation narrative in order to provide a rational account of the phenomenal world, the realm of change. The rational enquiry into the realm of change is precisely the task of ancient physics. Contemplation of Scripture, then, leads to contemplation of the phenomenal world. ‘Genesis’ means precisely that: generation, becoming. In defending the role of the material principle, Nyssen re-installs the world of Heraclitean flux, and all its challenges, back in the centre stage of the hexaemeral discussion. The enquiry into the nature of light is an integral part of the broader enquiry into the nature of change. The physics of light is no disconnected part of the rest of the physical world. That means that the physics of light is an intrinsic part of the mechanics of nature, of the *technikos logos* of the world. Contrary to contemporary physics, which has not yet achieved a unified

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<sup>107</sup> See *In Hex.* 71 GNO 77.14-9.

<sup>108</sup> See *In Hex.* 10 GNO 20.17-21.1: *fiat lux* as the first double manifestation of the *logos* as divine wisdom and divine commandment.

<sup>109</sup> See 5 GNO 11.5-6: *eis ton gnophon tēs tōn aporrētōn theōrias*; 75 GNO 81.3-4: *kathaper en adutois tisi tēi sophiai genomenos tōn arrētōn epēkroasato*; 76 GNO 83.1-2: *en tois adutois tēs noētēs genommenon phuseōs*.

theory of everything, the physics of light of the *Apology* is but one aspect of a comprehensive theory of change, or of *how* things come to be and pass away.

The *Apology* reduces all explanations of change to the theory of the four elements (fire, air, water and earth) and their mutual inter-transformations. The outlines of the theory are Aristotelian: each element consists of a pair of two opposite but not contrary sensible qualities (hot and cold, dry and wet), which Nyssen already accounted for in his theory of matter. Fire is hot and dry, air is hot and wet, water is cold and wet and earth is cold and dry. Nyssen, following Aristotle, allows changes to take place between all four elements by an exchange of qualities. Water (more generally: liquid) becomes air (more generally: gas) under the effect of external heat (e.g. of the sun) by a substitution of hot for cold. Similarly, air becomes fire by a second transmutation of cold into dry etc.<sup>110</sup> Nyssen uses this theory to explain all natural phenomena in the universe, from the hydrological cycle to meteorological and astronomical phenomena. This comprehensive explanation is a divergence from Aristotle, who limited the use of the four elements to the sublunary, arguing that a different substance is active in the supralunary – a doctrine refuted by hexaemeral authors due to the religious overtones of the celebrated ‘fifth element.’<sup>111</sup> For Nyssen, aether is not a new element but just a finer form of warm air extending beyond the atmosphere towards the vast regions of outer space. It is vital for the nourishment and sustainability of the celestial fire of

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<sup>110</sup> The key passages are §§ 29 and 55, clearly elaborating on the standard Aristotelian theory of the elements as we know it from the GC II.2-4. Risch, *Sechstageswerk*, 216-7 n.328, argues that Nyssen distances himself from the Aristotelian doctrine in various respects, e.g. in adding quantity (*pēlikotēs; posotēs*) and weight (*baros*) to the essential characteristics of the elements (§§ 41 and 55). I do not think there is deviation here. The point of Aristotle’s theory is not to deny the rest of the sensible qualities, but to give a parsimonious account of them. He thus reduces all sensible qualities to pairs of contraries, like hard and soft, rough and smooth, heavy and light etc., and then reduces these contraries to two pairs: hot and cold, dry and wet, see G.E.R. Lloyd, *Aristotle: The Growth and Structure of His Thought* (Cambridge: Cambridge University Press, 1968), 167. Thus, in §55 the light (*kouphon*) is an attribute of fire and air while the heavy (*baru*) is an attribute of earth and water. This is a faithful application of Aristotle’s doctrine in *Cael.* I.3 and IV.1-5 (cf. also GC II.3), which classifies the elements from the lightest (fire) to the heaviest (earth). Nyssen may be further suggesting that this attribution is due to the elements’ defining characteristics, which explains why he connects the wet, the cold and the dry with heaviness in §41. But that would be a clarification of the original Aristotelian doctrine of *Cael.* IV.4-5, probably necessary in view of Stoic developments (see e.g. Philo *Heres* 134-5, 146), and certainly no deviation. Again, in §41 Nyssen clearly states that quantity and weight are not the *differentiae* of the elements, but what survives the transmutation. Quantity and weight denote here the surviving material *substance* (cf. §39 *ho de kata tēn hulē ogkos*; §40 *to hulikon*), which they always accompany. This, in turn, corresponds to Aristotle’s material *substratum*, according to GC I.6 and II.1. One could argue that the idea of a surviving material characterized only by weight and quantity is an early anticipation of the modern concept of ‘mass.’ But that is, once more, not a deviation from the original Aristotelian theory, but a brilliant interpretation.

<sup>111</sup> On Aristotle’s ‘primary element’ or ‘first body’ (*prōto stoicheion, Meteor.* 339b16-30; *prōton tōn sōmatōn, prōtē ousia, Cael.* 270b1-25), the ‘fifth element’ or ‘heavenly body’ of the tradition (*apud Alexander apud Simplicius, In Cael.* 436.4-6), see Moraux (1963). On the role and place of the fifth element in Aristotelian physics see Lloyd (1968), 134-9. It was passages like *Cael.* 269a31, 270b5-25-11, 284a2-17 and *Metaph.* 1074a38-b14, endorsing popular religious ideas about the divinity of the heavenly substance, that prohibited the hexaemeral authors from accepting Aristotle’s fifth element, see Origen *DP* III.6.6, *CC* IV.56; Basil *Hex.* I.11, III.3 (dialectical refutation of the Peripatetic doctrine) and II.6 (identifying heaven with fire); Ambrose *Exam.* I.6.2-4 (detailed refutation of the Peripatetic doctrine); Nyssen *In Hex.* 18 GNO 30.5-8 (explicit refutation of the existence of another – viz. fifth – element); see further the monumental study of Pépin (1964), esp. 151-72 (on the divinity of the fifth element) and 103-25 (on the Epicurean background to Ambrose’s refutation).

the stars.<sup>112</sup> The aim of the hexaemeral theory of the four elements is to address the fundamental challenge of ancient physics, namely how to account for the mixture of identity and flux that characterizes all sensible phenomena. Nyssen's answer is not innovative: identity is due to the innate qualities of elements; change is due to their inter-transformations.

What, then, is nature (*phusis*)? The Creator who made the earth's elements did not endow any one of them with constancy and permanence. That is, all things are subject to change and the power of change is maintained through other things by means of a certain type of revolution where everything reverts to some earthly element and they return into themselves from other elements. This change (*alloiōseōs*) is unceasing among the elements and by necessity they pass into other things, undergo alteration and once again change into other things, for not one of them retains its own identity unless it mixes with another durable substance. How, you ask, does change come about through the four changeable elements which go around in a circular course? For all things do not change to all things nor does the cycle of change (*ho tēs alloiōseōs kuklos*) proceed in the same manner through all beings; rather, water flows into air in the form of exhalations and after the exhalations have nourished fire they turn into earth, like some kind of residue after it has been burnt. After the earth has received them the cycle of change (*ton tēs alloiōseōs dromon*) comes to a halt. It remains to be seen whether the nature of water has its origins from the earth, and we must consider if earth can change its nature into water.

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<sup>112</sup> The key passages on the nature of aether are §§36-7 and 48. On the theory of exhalations see §§34-5, the consequence of which is the nourishing of celestial fire, see §§ 46 GNO 59.11-2; 47 GNO 60.9-11; 53 GNO 64.11-3. The precise role and function of aether in the sources is problematic, simply because every late antique school had a concept of 'aether' in its cosmology, see Waszink (1950). As already explained, Nyssen rules out the Peripatetic notion of aether as the fifth element. Since Nyssen distinguishes between the denser air of the sublunary and the subtler aether (§§ 36, 44, 75), while he adheres to a system of four elements (§§29, 31), we can safely infer that aether denotes the fine stuff that fills outer-space, i.e. the supralunary, Nyssen's biblical 'firmament' (§18) and Paul's 'second heaven' (§75-6), which hosts the celestial fire of the stars (46 GNO 59.11 *en tōi phlogōdei*; 47 GNO 60.9-10 *ton huperkeimenon kai phlogōdē chōron*) that revolve in it (18 GNO 30.8-9 *to akron tēs aisthētēs ousias hoper hē tou puros phusis peripolei*; 75 GNO 82.5-8 *to meta tēn aplanē sphairan peri to entos theōroumenon en hōi oi planētai tōn asterōn diaporeuntai*). Nyssen thus distinguishes between three things: the outer space (= the supralunary); its stuff (= aether); the heavenly bodies that revolve in it (= the planets and stars). Since the heavenly bodies are made of fire (see next section), Nyssen seems to rule out the notion of aether as celestial fire, an ancient use attributed by Aristotle to Anaxagoras (*Cael.* 270b24-5; *Meteor.* 339b20-5, 369b14-5) and made popular by the Stoics, see Lapidge (1973), 254-9; and Long and Sedley (1987), §§46-7 with comments *ad loc.* That brings Nyssen closer to the mainstream use of aether as 'fiery upper air' in archaic and classical Athens, see Mihai (2010) and (2015), 104-13. We find this use in the *Phaedo* (109b-c, 111a-b) and the *Timaeus* (58d), where aether denotes the purest form of air, but also in the *Epinomis* (984b-c, e), which situates aether between air and fire. It is precisely this finest form of warm, fiery air extending in the supralunary that Nyssen has in mind when he speaks of aether in the *Apology*. In that sense, aether can be called a fiery substance, see 48 GNO 61.21-62.2 (*aitherion eidos...puros phusis*). He clearly takes this use from Basil, see *Hex.* II.7 GCS 32.7-18 (*phusis leptē kai diafanēs*), III.7 GCS 49.14-50.14 (*aithera purōdē kai diakaē*). Other hexaemeral authors understood aether rather in the Anaxagorean-Stoic sense of pure, celestial fire. This is clearly the case when Origen identifies aether with light in the context of his doctrine of the 'spiritual body,' see *DP* I.4.1, II.3.7, II.4.3, III.6.4. But cf. *CC* III.42 where Origen speaks of 'aether and the realms above it' rather in the sense of the *Epinomis*. It seems to me that the latter is also the meaning of aether in Philo *Opif.* 70, but also *Plant.* 14, 18, 21-2, for which Colson rightly translates 'upper air.' But cf. *Plant.* 3, which understands aether in the Stoic version of pure celestial fire, and *Deus* 78 which identifies the pure flame of the Sun with aether in the traditional Stoic way. The use is therefore ambivalent, see Dillon (1983), 198-9, unless celestial fire is just condensed masses of aether, see Philo *Deus* 78: *hēlios ... pilēma aitherion*; Plutarch *De Facie* (928c = SVF II.668): *to aitheros to men augoeides kai lepton hupo manotētos ouranon gegonenai, to de puknōthen kai suneilēthen astrā*; ps.-Justin, *Quaest. Christ. ad Gentiles* 172c: *ho hēlios pilēma, aitheroeides tēi ousiai, lampros tōi eidei*. If that is the case, there is no real deviation between the Philonic-Origenian language of 'aether' and the Cappadocian language of 'pure fire' as regards the composition of the heavenly bodies.

[...] If it has been shown that cold is a complementary quality of water next to moisture, it follows that, since the quality of cold is innate also in earth, the water is potentially in earth and the earth in water... (In *Hex.* 53-4 GNO 63.18-64.18 and 56 GNO 66.16-20 tr. McCombley, modified)

Nyssen sees the theory of the four elements contained *in nuce* in the opening verse of *Genesis*: ‘heaven’ and ‘earth’ denote the fundamental contrariety of sensible qualities (*ta men akra*) and thus the extreme limits of materiality. The extremes also imply their middle terms (*ta de mesa*).<sup>113</sup> As it stands, Nyssen’s doctrine is obscure. It becomes transparent once we compare it with the Timaeon theory of the extreme and middle terms of which the world’s body is constituted (Tim. 31b4-32c4). The comparison helps us perceive that, in Nyssen’s reading, the scriptural ‘heaven’ and ‘earth’ correspond to the Timaeon fundamental duality of phenomenal properties: visibility and tangibility. The latter properties presuppose, in turn, two primary but contrary elements: fire, which illuminates everything due to its mobility and subtlety (Tim. 58b); and earth, which manifests solidity being the most immobile and pliable body (Tim. 55e). The middle terms required for the bonding of the contraries correspond to the other two basic but derivative elements, air and water, manifesting median subtlety and solidity (Tim. 56a-b, 58b). Thus, *Gen.* 1:1 entails, in Nyssen’s adaptation of Timaeon physics, the existence of the four elements in their potential state, together with their cycle of inter-transformations. And since corporeal beings are composites of the four elemental bodies, *Gen.* 1:1 also entails the existence of all corporeal beings – potentially. Thus, the whole creation narrative becomes a disquisition of how *Gen.* 1:1 unfolds in time, in exactly the same way that all corporeal beings can be derived through a series of inferences from the cycle of the four elements. The *akolouthia* of Scripture entails the *akolouthia* of nature.

The beginning of the creation narrative establishes then the following preliminary point for us to grasp, namely that God laid down all at once (*sullēbdēn en akarei katebaletō*) the constituents (*aphormas*) of all things, the causes (*aitias*) and the powers (*dunameis*), and by the first impulse of his will the substance of each being, such as heaven, aether, the stars, fire, air, sea, land, animals and plants, came together (*sunedramen*). God beholds them all by reason of his power; as the prophet says, ‘He saw all things before they came into being’ [Dan 13.42]. By his power and will each and every part of the cosmos achieves its end, following a certain determined chain of events (*heirmos tis anagkaios*) and order (*kata tina taxin*) so that a particular substance (*tode ti*) [namely fire] first appeared preceding all things that can be seen in the universe, and in the same way appeared that which comes by necessity after the first, and then the third, as the designing nature (*technikē phusis*) foreordained, then the fourth and the fifth and so on in order of sequence (*tēs kata to ephexēs akolouthias*). Not by a spontaneous circumstance (*ouk automatōi tini suntuchiai*), appearing randomly and without order, but following a sequential pattern (*to akolouthon*) as the necessary order of nature requires of everything that partakes in becoming. That is how Moses said that everything was made, expounding in narrative form the doctrines of natural philosophy (*en diēgēseōs eidei peri tōn phusikōn dogmatōn philosophēsas*), foretelling how each thing come to be according to certain divine commands. (In *Hex.* 9 GNO 18.7-19.10 tr. McCombley, modified)

As the sequence of events flowing from *Gen.* 1:1 unfolds, we find the four elements in an initial state of total blending, with their powers neutralized by each other’s contrary qualities.<sup>114</sup> In order to pass from potentiality to actuality, the elements need to be separated from each other. The separation (*diakrisis* or *apokrisis*) allows them to exhibit their intrinsic

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<sup>113</sup> See *In Hex.* 9 GNO 18.3-6; 16 GNO 26.16-27.8. This doctrine is already announced in *Opif. hom.* I.2 and I.5, as a recapitulation of Basil’s doctrine. Basil indeed makes this exegetical move in *Hex.* I.7.

<sup>114</sup> See *In Hex.* 7 GNO 15.19-16.11; 9 GNO 18.7-13; 16-17 GNO 27.10-29.6.

characteristics and occupy their natural place in the universe.<sup>115</sup> Separation then provides a first rational model for the explanation of change. As the initial state of total blending disappears, qualified being emerges. Thus, the mechanics of separation reveal the *logos* at work shaping the world.<sup>116</sup> Moses depicted the work of the innate *logos* through the rather anthropomorphic narrative of days and divine commands. This narrative must be understood in a higher sense (*theoprepōs*).<sup>117</sup> The work of the first three days denotes simply the actualisation of the four elements in descending order of succession, from the most agile and subtle to the most heavy and solid: fire on day one, followed by air, water and earth on days two and three. ‘Let there be light,’ is then nothing more than the narrative expression of the first manifestation of the *logos* in nature. The transition of the fiery element from a state of potentiality to a state of actuality becomes the first manifestation of qualified being.<sup>118</sup>

## 2. A physics of power: The co-substantiality of fire and light

The question then is: how does the separation of fire from the rest of the elements take place? Nyssen’s answer picks up on a difficulty in Aristotle’s theory of the elements. It is helpful here to recall that according to the considered view of the *Timaeus*, the capacity of the elements to transform into each other is limited to three (fire, air and water), while earth is excluded entirely from the cycle of transmutations (*Tim.* 54c-d).<sup>119</sup> Aristotle is quite critical of this exception, claiming that it contradicts observation (*Cael.* 306a1-7), and he explicitly mentions the production of fire from earth (*GC* II.4 331a33-331b23). And yet Aristotle does not provide any practical examples of how this generation of fire from earth can be observed. For a useful insight we have to look elsewhere. We get an interesting lead from Theophrastus, Aristotle’s student and collaborator, who, in the special treatise *On Fire*, gives us two examples for the production of fire from earthy materials: the striking of stones and the rubbing of sticks (*Ign.* 1.4-7). These examples will become classical in subsequent literature.<sup>120</sup> Cicero will use them to illustrate how fire permeates everything, including the earth (*Nat. deor.* II.9.25). We find the same examples widespread in the context of the hexaemeral elemental theory in its Basilian inspiration.<sup>121</sup> Nyssen has precisely this context and these examples in mind in his explanation of the generation of fire from the initial state of total

<sup>115</sup> See *In Hex.* 10 GNO 10.10-17: *adiakritōs*; 12 GNO 22.15-18: *hē phōtistikē dunamis heautēn tōn heterophuōn apokrinasa*; 19 GNO 31.19: *hē de tōn hudatōn diakrasis*; 25 GNO 37.17-8: *tē photistikēs te kai purōdous ousias tais idiais poiōtēsi tōn allōn apokritheisēs*; 26 GNO 39 14-5: *hē to hudōr tēs gēs apokrinousa theou phonē*; 40.10-2: *to apokrithen tēs hugrotētos*.

<sup>116</sup> See *In Hex.* 10 GNO 20.17-21.6

<sup>117</sup> See *In Hex.* 9 GNO 19.5-15; 26 GNO 39.14-5, 40.3-8. So, too, for the Psalmist: 11 GNO 22.11-14. *Theoprepōs* literally means ‘in a sense worthy of God’ or ‘befitting God.’ Its opposite is *anthrōpopathōs*. As Sheridan (2015), esp. 27-44, has shown, *theoprepōs* is an Origenian trope introducing the higher sense of Scripture against anthropomorphic interpretations. In the *Apology* it signals the passage from the phenomenal aspect to the causal structure of creation.

<sup>118</sup> See *In Hex.* 9 GNO 18.13-19.5; 65 GNO 72.16-73.1; 72.

<sup>119</sup> In 49b-c the *Timaeus* seems to extend the possibility of inter-transformation to all four elements, including the earth. But Plato qualifies this opinion twice: *hōs dokoumen* (49b8); *hōs phainetai* (49c7). His considered opinion is given in 54c-d, which excludes the earth from the cycle of transformations.

<sup>120</sup> See further Plinius *Nat. Hist.* II.239; Porphyry *Ad Gaurum* XVII.4 Kalbfleisch 59.11.

<sup>121</sup> See Basil *Hex.* I.7 GNO 13.15-20; Ambrose *Exam.* II.3.12; Severian *In cosmogoniam* I.5 PG 65:435.

blending,<sup>122</sup> Scripture's 'invisible and unformed earth' (*Gen. 1:2a*).<sup>123</sup> The examples aim to show the generation of fire by friction and hence by force. The implicit suggestion is that some kind of violent motion in the initial chaotic state of the pre-cosmic materials caused friction which, in turn, kindled the primordial fire.<sup>124</sup> Being of an agile and swift nature, fire separated itself immediately from the other elements, illuminating the all. That leads to the first fundamental tenet of Nyssen's physics of light: Light is the innate capacity or power of fire to illuminate. Conversely, fire owes its power of illumination to its inherent *logos*. The exact structure of that *logos*, however, is elusive.

When the world was made and before each of its parts appeared, darkness covered everything; fire's splendour (*tou puros hē augē*) lay hidden within matter and did not yet come forth. The situation was comparable to small pebbles who are concealed in the gloom, though they have in them the power to illuminate (*en heautais tēn phōtistikēn echousi dunamin*) by producing fire when they strike one another; but when the spark (*spinthēros*) that comes from them blazes up (*anaphantos*) they too appear due to its brilliance (*tēi lampēdoni*). Thus, everything was invisible and imperceptible before the luminous substance (*phōtistikēn ousian*) was revealed. For, since everything came into being at once by a single movement of the divine will, each element was compounded with others and fire was clouded in darkness, hidden under an abundance of matter. But because its power (*dunamis*) is both sharp (*oxeia*) and agile (*eukinētos*), the moment God gave the signal to nature (*tēi fusei tōn ontōn*) to give birth to the world, fire leaped out before the other elements, which were heavier (*pasēs tēs baruterās phuseōs proexethore*), and immediately everything was surrounded by light.

...

The luminous power (*hē phōtistikē dunamis*) assumed first place and was set apart (*apekrithē*) from the other elements (*tōn ontōn*) by reason of its swift (*tachei*) and agile (*eukineitōi*) nature, separating itself from the rest (*heterophuōn*). And all that was kindled (*to perilampthen hapan*) was filled with light (*katēphōtisthei*) by its radiant power (*dia tēs apaugastikēs autou dunameōs*). God alone can say what is the *logos* through which (*hōi de logōi*) the fiery substance acts this way, God who has endowed nature with the *logos* of light (*ton phōtistikon logon*). And the great Moses in his own writing bears witness to this when he says, 'And God said, "Let there be light."' In my opinion the passage teaches that the work of light (*to tou phōtos ergon*) is a divine *logos* (*theios logos*), exceeding all human understanding. We may only consider the outcome (*to ginomenon*) and acknowledge the marvel through our senses. But what is the abode from which fire is suddenly generated, whether it springs forth through the striking of stones or through the friction of any other material with itself, and what is the power (*dunamis*) that consumes everything that fire encompasses, while it illuminates the air by its flame, all this we can neither know nor anyhow understand. The only thing we can say is that the account (*logos*) of this strange marvel is reserved for God, who made through the ineffable *logos* of his power (*kata ton arrēton tēs dunameōs logon*) the light to be born from fire and together with fire (*eggenēthēnai*) as Moses testifies in his own account (*logōi*), 'And God said, "Let there be light and there was light," and

<sup>122</sup> See *In Hex. 10 GNO 20.4-8* (text cited below).

<sup>123</sup> See *In Hex. 10 GNO 20.8-13* and *17 GNO 28.12-29.6*. This is Nyssen's interpretation of the Hebrew *tohu wabohu*, equivalent to a chaotic state of primordial qualities, see Gronau (1914), 116; Spoerri (1959), 76-7; Risch (1999), 154 n.134.

<sup>124</sup> The force that set the *akolouthia* of nature in motion is the divine *logos* or command (10 GNO 20.14-21.6) which manifests God's creative wisdom, power and will (11 GNO 22.5-6, 11-2; 7 GNO 14.17-9, 15.3-4). The idea of the separation of the elements by friction goes a long way back into ancient Greek cosmogony, see the still helpful study of Spoerri (1959). Nyssen, here, is clearly developing a biblical version of *Tim.* 52d-53b. His own contribution is to show that the will of the Demiurge is the cause of the agitation of the receptacle (i.e. the 'earth' of *Gen. 1:2a*) that leads to the separation of the elements. This shows that Nyssen writes the *Apology* with the Bible and the *Timaeus* both on his desk. A mere secondary knowledge of Timaeian physics through doxographic material or an *epitomē* cannot explain that level of reflection. Nyssen must have studied closely the Timaeian physics, which he skilfully combines with a close reading of Aristotle's *De caelo*, *Meteorologica* and *De generatione et corruptione*, as we have seen. Passages like *Tim.* 53a1-2 allow him the combination. Moreover, that level of sophisticated analysis requires access to the commentary tradition, for which see Baltes (1976-8).



God saw that it was good' [Gen 1.3-4]. (*In Hex.* 10 GNO 20.1-17 and 12 GNO 22.15-23.13 tr. McCambley, modified)

The passage invites three kinds of remarks. The first has to do with the remarkable affinity of the language of fire and light. Nyssen uses the terms relationally, if not reciprocally: light is the 'illuminating' (*phōtistikēn*) or 'radiant power' (*apaugastikēn dunamēn*) of fire. Conversely, fire is the 'luminous substance' (*phōtistikē ousia*).<sup>125</sup> Nyssen understands the relationality of light and fire in a strong sense. This allows him to speak of fire and light even interchangeably as when he says that 'the luminous power (*hē phōtistikē dunamis*) assumed first place and was set apart from the other elements.' Here, Nyssen is not separating fire's power from the other elements but describing the separation of fire *qua* substance from the other elements. It is the separation of the fiery substance that also releases the power, namely light. All this makes sense if light is conceived as an innate power or capacity of fire, co-existing with it. Fire does nothing extra in order to bring out the power of light. As long as there is fire, there is light too, 'necessarily' and 'automatically.' This allows Nyssen to use the terms synecdochically, substituting one for the other. The use of synecdoche becomes particularly noticeable in the exegesis of day four (§§64-73). Here, Nyssen speaks of 'light' (*phōs*), of 'the luminous power' (*hē phōtistikē dunamis*) and of 'the luminous substance' (*hē phōtistikē ousia*) to denote, interchangeably, the light of the stars or their fiery substance.<sup>126</sup> Exegetically, the substitution of 'light' for 'fire' helps underline the link between the work of the first day (*phōs* = light) and the work of the fourth day (*phōstēres* = luminaries). But there is more going on here than a simple rhetorical device. The synecdoche bears a truth-value because it rests upon the fundamental causal relationship of substance-property that links fire and light.

The previous remark leads to the following, which has to do with the nature of the relation of fire and light. Nyssen claims that it is impossible for us to grasp the *logos* that explains *why* light is the natural capacity or power of fire. We may see *how* light relates to fire, as natural property to substance, but the reason *why* this particular property relates to this particular substance is elusive. Apparently, we stand before an intrinsic feature of the world that is impossible for us to analyse further. In the passage from the *Apology*, Nyssen speaks of light as being 'inborn' (*eggenēthēnai*) to fire. In another contexts, he speaks of light as a 'natural property' of fire (*C. Eun.* III.6 GNO 28.10 *phusikēn idiotēta*), as 'innate' to fire (*C. Eun.* I.1 GNO 415.2 *sumphuēs*), and as 'co-existing' with fire (*C. Eun.* I.1 GNO 532.8 *sunuphistanēn*). We must simply accept the co-substantiality of light with fire as quasi-axiomatic. It is a phenomenal fact. That makes it futile to enquire further into the *logos* that binds fire and light as substance and property. We can only accept the fact and study its consequences.

The third remark is the natural outcome of the previous two. The most fundamental consequence of the intrinsic relation of fire and light is that light becomes part of the physical

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<sup>125</sup> I here translate *ousia* as 'substance,' without specifying whether it means a particular entity (a 'this' or *tode ti*) or a natural kind (a 'such-and-such' or *eidōs*). At the end of the third chapter I will suggest that it means both. If so, the terminological ambiguity is intended and it should be kept in mind from now onwards.

<sup>126</sup> In sections 69-73 (on the creation of the stars), Nyssen speaks of fire in three occasions: 65 GNO 72.20 *hē purōdēs kai phōtistikē dunamis*; 66 GNO 74.5 *tēs purōdous ousias*; 69 GNO 75.14 *tēn kinēsīn tou puros*. These references help the reader realise that Nyssen is indeed referring to (celestial) fire when he uses the light terminology to speak of a natural substance, see e.g. 66 GNO 74.11-2: *tou phōtos moriōn* = particles of light (i.e. fire); 67 GNO 74.14: *en tēi phōtistikēi ousiai tēs hēliakēs phuseōs* = in the luminous (i.e. fiery) substance of the sun, etc.

world *qua* natural property of a physical substance. Being an intrinsic feature of one of the four elements, light acquires physical characteristics and exhibits physical properties: brightness, radiancy and lustre. If we press the question, we might even get the following answer: light has a natural brightness (*augē*) due to its lustre (*lampēdōn*) which gives it the power to shine (*apaugastikē autou dunamis*). Light then exhibits physical characteristics (brightness, radiancy and sheen) and a certain physical behaviour (co-existence with fire). Being the natural power of fire requires, then, the physicality of light.

These remarks do not sound like an epoch-making discovery. The synecdoche of fire and light goes at least as far back as Parmenides.<sup>127</sup> It is also attested in Empedocles<sup>128</sup> and reprised in the *Timaeus*.<sup>129</sup> Similarly, the insight that light is the productive power of fire is established by Plato in the celebrated ‘sun simile’ of the *Republic*.<sup>130</sup> This parallel use of the term ‘light’ will later prompt Plotinus to distinguish between ‘light’ as fire and ‘light’ as the power of fire.<sup>131</sup> Thus, the intrinsic connection of light to fire and the physicality of light are undeniable, empirical facts in Greek thought. What might sound as a trivial fact in the context of Greek physics, however, becomes a hard-won conclusion in the context of hexameral exegesis. Remember the debates about the literal or allegorical meaning of the biblical creation narrative. Recall the attacks against its rationality. Call to mind the doubts against the coherence of hexameral physics, and recollect the attempts to ground ancient theories of light to sight. Once the hexameral exegetes are able to assert, however, the physicality of the light of creation, all the doubts are dispelled, the charges dropped, and the objections refuted as invalid readings of *Genesis*. The intrinsic connection of light to fire, the connection of a natural property to its substance, dictates how to properly read *Genesis* 1:3. The reference of the verse is to the physical light of the world. It is the connection with fire that guides this interpretation.

‘No fire, no light,’ is then the hermeneutical guideline behind *Gen.* 1:3. In the context of biblical exegesis, the consequences of this guideline are tremendous. It invites the biblical exegete to explore further the physicality of light. It inaugurates a certain exegetical pattern by suggesting that, if fire is the subject matter of day one, then the other elements must be, for reasons of hermeneutical consistency (i.e. due to the *heirmos* of Scripture), the subject matter of the following days of creation. And it opens up a bridge from physics to metaphysics by grounding the exegesis of day one on the substance-property relation, as an expression of the primitive, i.e. not further analysable, relation of a substance to its natural, productive power.<sup>132</sup> The result is the transformation of a hermeneutical working hypothesis into a

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<sup>127</sup> In the *proem* of Parmenides’ poem, *phaos* denotes ‘light’ (B 1.10). In the second part of the poem, the so-called *doxa*, *phaos* denotes ‘fire,’ as the apposition of *phlogos aitherion pur* (B 8.56) with *phaos* (B 9.1) shows, see Leonardo Tarán, *Parmenides* (Princeton, NJ: Princeton University Press, 1965), p. 231 n.1.

<sup>128</sup> In the famous lantern simile B 84 DK (=88 Wright), as the apposition of *phōs d’ exō diathrōiskon* in B 84.5 with *pur d’ exō diathrōiskon* in B 84.10 shows. I discuss the simile in the next chapter.

<sup>129</sup> *Tim.* 39b: ‘the god kindled a light (*phōs*)..., the light that we now call the Sun.’

<sup>130</sup> *Rep.* 507e6-508a2; 508b6-7; 508e1-3 by analogy; 509b2-3.

<sup>131</sup> *Enn.* II.1.7.25-30. As Plotinus rightly remarks, we stand in front of a clear case of homonymy. I discuss this further in the next chapter.

<sup>132</sup> For this notion of ‘power’ and its underlying ‘metaphysics of power causality’ see the monumental study of Barnes (2001). My intention here is not to revisit Barnes’ thesis, with which I concur, but to show that light is the paradigmatic case of power causality – a fact not adequately discussed by Barnes. Moreover, Barnes does not discuss the Jewish-rabbinic underpinnings of the metaphysics of power. As Endo (2002), 165, 250, has

verifiable exegetical project. What began as constructive hermeneutics with Basil, namely the possibility of a sustained literal reading of *Genesis* 1 starting with ‘light,’ acquires with Nyssen a robust theoretical grounding in contemporary physics. Every fourth century hexaemeral author drew more or less extensively from the same pool of physical theories as Nyssen.<sup>133</sup> But no one gives us the full story of light so clearly and magisterially narrated as Nyssen does in the *Apology*. To suggest that Nyssen’s work goes against Basil or beyond the scope of hexaemeral exegesis, as the proponents of the discontinuity thesis do, would result in the loss of a valuable piece of information for understanding the hexaemeral project. It would dissociate the hexaemeral literature from the work that provides the key to deciphering why and how the hexaemeral exegetes regarded primordial light as co-substantial with (while causally dependent on) elemental fire. If my analysis is correct, this is a key that we cannot afford to lose. The *Apology* gives us the ultimate textual proof that a proper physics of light was developed in late antiquity as part of the Jewish-Christian hermeneutic and apologetic tradition.<sup>134</sup> This hexaemeral physics of light understood itself as a proper enquiry into the physicality of light as the natural capacity or power of fire. It is the enquiry into light’s own physical behaviour and characteristics.

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shown, early Jewish exegetes understood the creation of light as a manifestation of the sovereign power of God. If so, the hexaemeral metaphysics of light brings together two intellectual streams: the Greek philosophical tradition and the Jewish exegetical tradition of light as power.

<sup>133</sup> See Basil *Hex.* II.3: light is the natural power of fire (*phōtistikōn gar to pur*); II.7: the first *fiat* refers to the creation of the luminous substance (*phōtos phusin*); both doctrines combined in VI.2: *tote men gar autē tou photos hē phusis parēchthē; [to pur] tēn tou phōtizein tēn dunamin echon*. Ambrose *Exam.* II.3.14: light as the intrinsic property of fire (*siue de flammae lumine lumen accendas*); IV.3.9: light as the power of fire (*virtutem inluminandi; ignis inluminant; vis inluminatiois*). Severian *In cosmogoniam* I.4-5 PG 65:433-6: an exciting variant of the same doctrine as Basil and Nyssen (*Gen.* 1:1-2a refers to the creation of the material ingredients [*tas hulās*], while the rest of the creation narrative refers to the shaping of particular beings; first *fiat* = creation of the element of fire [*hē tou puros phusis*]; fire has the natural power to illuminate [*phusin lampousan*]). Didymus’ text is badly damaged in the exegesis of *Gen.* 1:3-5. But we do get the physics of fire and power-metaphysics of light later, see *Commentary on Genesis* 233.20-9: fire (*pur*) has a twofold power (*dittēn dunamin*), to illuminate (*phōtizōn*) and to burn (*kaion*) Cf. Theophilus *Ad Autolycom* II.11 together with II.13 (lantern-simile): light is the illuminating power of fire (*to phōs phanerei; phainon hōsper luchnos*).

<sup>134</sup> The hexaemeral physics of light and fire remains a constant theme in the subsequent tradition, see Zaganas (2017), 234-6.



## CHAPTER 3

### The Nature of Light: The Dawn of the First Material Form

So “Let there be light,” says God, that is: Let the primordial causes proceed from the incomprehensible hiding-places of their nature into forms and species comprehensible and manifest to the understandings of those who contemplate them, “and light was made,” that is by the will and utterance of God the obscurity of the primordial causes proceeded into revealed forms and species (Eriugena *Periphyseon* III 692c8-12 tr. Sheldon-Williams)

This study began as an enquiry into the hexaemeral physics of light with the aim of recovering the mechanics of nature that clarify the early Christian theology of light. The enquiry stumbled upon two methodological obstacles. The first was the objection, raised by contemporary historians of science of the calibre of Simon and Smith, that there was no ancient *physics of light*, at least not in the sense that we understand light as an autonomous object of enquiry in modern science. The second objection was raised by ancient readers of Scripture and modern theologians who contested, for different reasons and from different perspectives, the coherence of a *hexaemeral* physics of light. Ancient erudite critics of Scripture like Galen and Celsus argued that the doctrine of *creatio ex nihilo* eliminated the role of the material principle, and hence of physics, in the biblical creation narrative. Modern theologians of the status of Barth and Bultmann insisted that Scripture ought to be kept separate from science, and hence from physics, rendering the hexaemeral theories of light irrelevant from the point of view of biblical exegesis. These obstacles might explain why there has been no systematic study of ancient theories of light in general and of their hexaemeral reception and further development in particular. At the same time, it was clear that if such a study were ever to take place, the above objections ought to be taken seriously and be either proved, condemning the initial enquiry as a failed project, or disproved and, in view of the obvious fact of contrary textual evidence, be set aside to let the investigation proceed.

In the first chapter of my study I dealt with the first objection. There I argued that there is compelling textual evidence for a proper study of the physics of light in the ancient world and that the road was open to pursue this new approach from within the body of hexaemeral literature. In the second chapter of my study I carried the argument forward, addressing the second methodological objection. I investigated the reasons why hexaemeral exegetes felt no scruples in blending science with biblical exegesis, seeing fit to place the physics of light at the service of Scripture. The analysis showed that hexaemeral exegetes relied on the ‘hard science’ of their time to demonstrate that light acts as a physical agent in the world. The demonstration of the physicality of light played a vital role in biblical hermeneutics. It paved the way for a physicalist interpretation of the biblical creation narrative, the kind of reading that we recognize today as ‘literal.’ And since the physicalist interpretation passed through the theory of the four constituent elements of the world and their sensible qualities, the

exegesis of light signalled from the first verse of *Genesis* the recourse to physics for the sake of hermeneutics. Through the physicalist interpretation of the first *fiat*, it was now possible to argue that the biblical creation narrative defined the realm of phenomenality, revealing the laws of nature that underlie all stages of God's creative act. These laws were the technical *logos*, immanent in all six stages of God's creative act, viz. in all the hexaemeron, guiding each particular thing to its fruition, as a well-functioning part of a meaningful whole. The second chapter of my study culminated in the view that the *logos* immanent in light was the *logos* that defines the irreducible relation of a substance to its natural capacity or power. The enquiry revealed, with the help of Nyssen's *Apology*, that hexaemeral light was theorized as the natural capacity or power of fire, the first of the four physical elements. The hexaemeral physics theorized fire (the luminous substance) and light (its luminous power) in terms of an inseparable unity: light co-exists with fire and acquires its physical characteristics through its intrinsic relation to it. Even more than that, 'light' is fire. And since the physical co-substantiality of light and fire, together with the semantic co-extensionality of the vocabulary of 'light' and 'fire,' could be derived from both the Greek and the scriptural thought-world, the hexaemeral authors had produced a disarming argument against their critics. The hexaemeral physics of light served simultaneously a double purpose: biblical apologetics *and* scriptural hermeneutics.

In this third and final chapter, I pick up the thread from where I left it and examine, in more detail, the meaning of the physicality of light and its relationality to fire. The enquiry will take us through ancient theories of light and their transformation in the hands of hexaemeral exegetes due to their scriptural commitments. At the heart of my enquiry lies the same observation as made by contemporary physics, namely the insight that light is a singular phenomenon in the world. This triggers a common set of questions between pre- and postmodern physics, though of course not common answers: how exactly to capture light's materiality? How to theorize light's physical characteristics, when light seems to abide at the limits of the material? It is this set of questions that animates the remaining part my study. In what follows, I leave behind all previous reservations and produce a systematic theory of hexaemeral light, which I reconstruct from a combined reading of Basil's *Homilies* and Nyssen's *Apology*. As my reading proceeds, I clarify further why I perceive the two works as expounding on the same physics of light, building on one continuous Cappadocian project. My reading focuses on three axes: the substance of light; the propagation of light; and the effects of light in space. This leads me to a discussion of the nature of the heavenly bodies, the nature of the light-ray, and the role of the medium in light mechanics. The investigation culminates in a causal analysis of light, tracing all the stages of light's dissemination, from the luminous source to the illumination of space.

Faithful to the hexaemeral project, my reading proceeds in two parallel planes, that of hexaemeral physics and of hexaemeral hermeneutics. This double reading produces a performative argument, showing that, from a hexaemeral perspective, physics and hermeneutics go hand in hand, contemplation of nature being the other side of the contemplation of Scripture. If my argument is correct, early hexaemeral exegesis included not only a detailed analysis of the physics of light but also the metaphysical grammar that supports it. What at first sight appears to be a reference to the creation of physical light, namely *Gen.* 1:3, turns out to be a reference to the very nature of light, introducing to creation, the first material form. The logic of the creation narrative then appears to have a

Heraclitean ring: just as the *logos* of nature likes to hide, so too does the *akolouthia* of Scripture. As the reading proceeds and the understanding of Scripture deepens, the physics of light transforms into a genuine metaphysics, but not before the reader has traversed material creation, only to realise that at the end of the phenomenal world lies the endless sphere of the ineffable. Having reached the limits of phenomenality, the reader is finally prepared to reprise the contemplative exercise, this time though from a different angle: creation as the dawn of an intelligible world.

## I. Between physics and metaphysics: The ‘immateriality’ of light

### 1. Scriptural questions

One of the most striking features of Basil’s hexaemeral exegesis was the emphasis on the aesthetic dimension most prominently expressed in his lyric encomium of light.<sup>1</sup> In Basil’s hexaemeral exegesis, light became the paradigmatic expression of the intrinsic beauty of all creation, yet not because of its alleged symmetrical structure, which it altogether lacked, being a simple substance, but because of its brightness. The best way to demonstrate this was through the contemplation of the gentle radiance of the light of the stars (II.7). There are two features in Nyssen’s exegesis that strike the reader when compared to Basil’s. First, there is a remarkable silence about the aesthetic aspect of light. Anyone who has read Basil’s *Hexaemeron* cannot help but initially wonder why there is no reference to the encomium of light in the *Apology*.<sup>2</sup> Secondly, and on a deeper level of reflection, one begins to understand that the *Apology* has a different way of paying tribute to the beauty of light: it gives us the means to figure out the mechanics of nature that make light so special. In his exegesis of day four, Nyssen provides several hints about the brilliancy of cosmic light and the celestial mechanics that govern it. Thus, instead of an encomium of light the *Apology* gives us the physics that explain it.

Claiming that light is the innate power or capacity of fire is one thing. Claiming that the light of the stars is the innate power or capacity of fire is another. It presupposes that the stars are made of a fiery substance. But that was a concession that not every erudite reader of Nyssen was willing to make. The debate about the substance of the heavenly realm and the bodies that abide in it was vigorous, notoriously controversial and almost entirely speculative.<sup>3</sup> In joining the discussion, Basil adopted a dialectical strategy, partly sceptical and partly

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<sup>1</sup> See above (1.1.3) with the relevant passage cited in full.

<sup>2</sup> In the *Apology* there is only reference to the beauty and goodness of *all* creation (§31), even *in the absence of light* (§21). Nyssen had already included the encomium of light in the first chapter of the *De opificio hominis* (I.5 Forbes 118), in which he summarizes Basil’s hexaemeral exegesis. The absence of the encomium of light in the *Apology* is therefore deliberate and clearly indicates that Nyssen’s *skopos* is not to repeat Basil’s exegesis but to carry it forward.

<sup>3</sup> For a survey of the available opinions and their variety see Achilles *Intr. Arat.* 5 (on the substance of heaven), 11 (on the substance of the stars), 19 (on the sun), 21 (on the moon); Aetius *Placita* II.11 (on the heaven: what is its substance), 13 (on the substance of the stars, moving and unmoved, and how they came to be); 20 (on the substance of the sun and that there are two and three suns), 25 (on the substance of the moon). See further Mansfeld and Runia (2009), with comments *ad loc.*

dogmatic. The core argument was sceptical: if the opinions of the schools dialectically oppose each other, they are mutually refuting. The consequences of the argument were dogmatic: the inherent incapacity of the scientific community to reach a consensus as regards the substance of the heavens entitles the hexaemeral exegete the freedom to follow the teaching of Scripture without further concerns about competing alternative theories.<sup>4</sup>

Behind Basil's dialectics lies a fundamental epistemological premise: the *logos* that is at work in the heavens is by its nature beyond the human capacity to grasp.<sup>5</sup> Thus, any theoretical attempt to give a full account of celestial physics is doomed to fail. Yet, with the help of a suitable scientific framework, we can grasp *that* there is a *logos* at work in heaven.<sup>6</sup> The scientific contemplation of the world exceeded, of course, the needs of the large crowds of Basil's audience. But it met the immediate demands of the erudite reader of Scripture. It was against this background that Basil formulated his idiosyncratic theory of the heavenly bodies as the celestial 'vehicles' (*ochēma*) of light.<sup>7</sup> According to the theory, the work of the first day was the creation of light; the work of the fourth day was the creation of the luminaries as vessels of the primordial light. The theory sought the support of the letter of Scripture, which was seen as distinguishing between the light (*Gen. 1.3 phōs*) and the light-bearers (*Gen. 1.14 phōstēres*) that shed it forth (*eis phausin; phainein*). The theory also had the support of some esoteric teaching of the Church,<sup>8</sup> with possible allusions to the theory of the luminous or spiritual body.<sup>9</sup> We certainly find the characteristic distinction between the *phausis* (kindling) of the first day and the *phōstēres* (luminaries) of the fourth in Origen's newly discovered *Homilies on the Psalms*, in an apocryphal context.<sup>10</sup> Basil reproduced the Origenian distinction between the light of the first day and the luminaries of the fourth, and left only allusions to its apocryphal background, eschewing the inner logic of the Origenian exegesis.<sup>11</sup> He was thus

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<sup>4</sup> See *Hex.* I.8 (on the substance of heaven) and III.3 (on the number of heavens). The same logic applies also for the enquiry into the nature of the stars in homily VI.1.

<sup>5</sup> See *Hex.* VI.1 GCS 89.8-9: *megethos anthrōpinēs dianoias ekbainei*; VI. 10 GCS 107.4: *logos arrētos*.

<sup>6</sup> See *Hex.* VI.1 GCS 88.20-1: *tēi de tou logou periousiai pros ouranon [s]auton huperarthēnai dunamenon*.

<sup>7</sup> See *Hex.* VI.2.

<sup>8</sup> See *Hex.* I.8 GCS 14.20: *en idiōtikois rhēmasin*; III.3 GCS 42.25-6: *ton ekklēsiastikon logon*.

<sup>9</sup> Henke (2000), 283-4, links Basil's astral vehicle (*ochēma*) of light with the celebrated Platonist doctrine of the luminous *ochēma* of the soul (*to augoeides tēs psuchēs ochēma*) and its correlative Origenian doctrine of the luminous spiritual body. The fact that Basil is here drawing from Origenian material of an apocryphal nature reinforces the assumption of a possible link with the theory of the vehicle. But the link is not straightforward. Basil's *ochēma* is the body of the light; the Platonist-Origenian *ochēma* is the light that functions as the body of the soul. The role is inverse unless Basil thinks of light analogously to the soul of a star. This is possible. At the end of this section I argue that the Cappadocians thought of primordial light as the first immanent form of creation. If the soul is the form of the body (cf. *De anima* II.1 412a20-1) and primordial light is an enmattered form, then the heavenly bodies are indeed the *ochēmata* of the primordial light. On the theory of the luminous vehicle of the soul see Sorabji (2012), 306-8, and Mihai (2015), 98-104; for its Origenian counterpart see my discussion above (1.III.1).

<sup>10</sup> See *Hom.* III in *Ps.* 73. The exegesis is textually based, see 3 GCS 255.17: *epi tōi rhētōi*. The context, however, is apocryphal, see 2 GCS 254.22-3: *ta tēs sophias logia ta aporrēta kai kekrummena*; 3 GCS 255.15: *kata tēn tropologian*.

<sup>11</sup> Basil gives several allusions to Origen's esoteric teaching of Christ as the true light of the world. He alludes to (but does not explicitly mention) Christ the *logos* as the theological teaching that is mystically (*mustikōs*) interspersed in the whole creation narrative VI.2 GCS 90.13. And he speaks of Christ 'the light of the world,' but only as a metaphor (*hōs gar*) that illustrates the physics of light (VI.2 GCS 91.6-1), while the purpose of Origenian exegesis is the inverse, i.e. to use light as an illustration of Christ. What Origen reveals lifting the veil of the letter of Scripture, Basil conceals, leaving only hints behind.



able to come up with an interpretation that paid attention to the scriptural text and relied on the interpretative tradition. What he did not come up with, however, was a new explanation of the inner logic of Scripture once he had eschewed the old, namely why God separated the light from its heavenly vessels by an interval of three days, especially if the heavenly bodies were necessary for the illumination of the cosmos (and if they were not, then why were they created at all?). Basil was aware of the hermeneutical challenge and went some way towards answering it: the biblical narrative mentions the creation of the sun on the fourth day, so that people realise that the sun is not the cause of creation (but part of it) and hence not the creator God. There is a clear anti-pagan message in Basil's defence.<sup>12</sup> But does it solve the hermeneutical challenge? Clearly not. The exact same problem would still hold even if the sun were created in the second or the third day, so why the fourth? To press the question more exactly: Why should there be an interval at all? What was the inner logic that led Moses to distinguish between the light and the luminaries that bear it? The question was raised by Peter and it fell upon Nyssen to answer it.

## 2. Philosophical investigations

Nyssen followed closely in Basil's footsteps. On the one hand he professed his scepticism of the human ability to grasp the *logos* of the heavens. On the other hand, his scepticism freed him from the need to further explain his choice of celestial physics. All he needed to do was follow the lead of Scripture, reprise the theme of light as a property of fire from day one and proceed directly from there. And that is precisely what he did. Sections §§64-73 of the *Apology* contain the most extensive and detailed treatment of celestial physics of fire and light in the whole body of early hexaemeral literature, rivalled only by the most elaborate technical treatises on astronomy and physics of the time. If one thing is absolutely clear from reading these sections, it is the view that stars are made out of fire. Upon this premise stands and falls all of Nyssen's celestial exegesis. Nyssen explains celestial light through a two-fold process of separation (*diakrisis*) and concurrence (*athroisis, sundromē*) taking place on the first and fourth day respectively (§§65-9). The *diakrisis* that took place on the first day was the separation of fire from the rest of the elements. The respective *sundromē* was the gathering of all the fire that was separated in heaven. Conversely, the *diakrisis* that took place on the fourth day was the distinction of the fire gathered in the heavens into an infinite number of parts. The respective *athroisis* was the gathering of all the homoiomerous parts into countless species. These are the stars that we see in the night sky. Each star is made of a particular species of fire, which occupies its proper place in heaven and sheds forth its own light. The infinite chorus of stars (§72 *to apeiron plēthos tōn asterōn*) betokens an immeasurable variety of luminous substances in heaven (§69 *tas apeirous tautas tōn photon diaphoras*). The brilliancy of the light of each star (§65 *tēs phōtistikēs dunameōs diaphoran*), i.e. its colour, frequency and intensity (*doxan*), is the innate capacity of the particular species of fire that constitutes it (§66 *kata tēn diaphoran tēs egkeimenēs autōi idiotētos*). Nyssen's celestial physics teaches us that the luminous power of each celestial body depends on the particular details of the composition of its fiery substance; and that the latter composition

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<sup>12</sup> On the 'solar theology' in late antiquity see the comprehensive study of Wallraff (2001). See further Armstrong (1940), 54-8; Dillon (1998-9); Moreschini (2018), esp. 376-7; Mace (2018), esp. 440-4. Christian hexaemeral exegetes vigorously attacked the 'solar theology,' see Origen *CC VIII.66*; Basil *Hex. VI.2*; Ambrose *Exam. IV.1-2*.

also dictates the place that each celestial body occupies in heavens. Luminosity then is the correlation of the internal geometry (density and weight) with the external locality (place in the universe) of a fiery body: the more homogeneous the composition, the greater the concentration of fire particles in it; the greater the concentration, the lighter its weight and the swifter its upward motion; the lighter and swifter, the closer it moves to the outskirts of heavens; the closer to the outskirts, the purer and brighter the light it radiates. This is because

the lightest and subtlest species of fire (*to men akrōs leptōn kai kouphōn tēs purōdous ousias*) and entirely pure (*kai katharōs aūlon*) dwells in the farthest limit of the material universe (*en tōi akrotatōi tēs aisthētēs phuseōs*), after which comes the intelligible and incorporeal realm (*hē noētē kai asōmatos phusis*); whereas the other species, which are more inert and heavy (*to de argoterōn kai narkodesterōn*), occupy the region beneath the lightest and subtlest. (*In Hex. 66 GNO 74.5-9, my translation*)

I have here translated the key word 'aūlon' not as the expected 'immaterial,' but as 'pure' in the sense of unmixed. There are obvious reasons for ruling out the possibility that Nyssen thinks of celestial fire as immaterial. If fire is a substance, and as such has sensible qualities, it belongs to the physical world and cannot be, strictly speaking, immaterial.<sup>13</sup> *Aūlon* then has another meaning and we can start unpacking it by following Aristotle's lead in the *De generatione et corruptione* II.8 that fire is the most 'form-like' of the four elements. The information we get from Aristotle's passage is worth recalling:

Additional evidence seems to be furnished by the food (*trophē*) each compound takes. For all of them are fed by substances which are the same as their constituents, and all of them are fed by more substances than one. ... Although food is akin to the matter, that which is fed is the figure (*morphē*) – i.e. the form (*eidos*) – taken along with the matter (*hylēi*). Hence it is reasonable that, whereas all the simple bodies come-to-be out of one another, Fire (*pur*) is the only one of them which (as our predecessors also assert) is fed. For Fire alone – or more than all the rest – is akin to the form (*kai malista tou eidous to pur*) because it tends by nature to be borne towards the limit (*pros ton horon*). Now each of them naturally tends to be borne towards its own place; but the figure – i.e. the form – of them all is at the limits. (*GC 335a9-21 tr. Joachim*)

The simple comparison between the passage from the *Apology* and the passage from the *De generatione et corruptione* shows that Nyssen adopts the Aristotelian premises of fire as the element that is more akin to the form (and in that sense *more* 'immaterial') *in relation to* the other elements because of its natural propensity to move to the limits of the material universe. There is one complication, however, with this comparison. For Nyssen the natural place of fire is the whole heavens, covering the vast regions of the supralunary from its uppermost part to the sublunary. For Aristotle, by contrast, the natural place of fire is at the limits of the sublunary. The supralunary, as already mentioned, is the place of aether, Aristotle's fifth element, which remains unmixed with the other elements, requires no nourishment and has no weight. Aristotelian physics, then, do not fully support Nyssen's theory. We need to turn to the Stoics for a fuller understanding.

The Stoic school accepted the presence of fire in the supralunary and thought of celestial fire as fire of the purest kind. According to at least one report, heavenly fire does not need fuel

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<sup>13</sup> Fire may be the lightest and subtlest of all elements (*to men akrōs leptōn kai kouphōn tēs purōdous ousias*), but this still means that it has a minimum weight and density, no matter how light (*kouphōn*) and rare (*leptōn*) it is. Since weight and density are tangible qualities, fire belongs to the physical realm.

to sustain itself. It takes, therefore, no admixture, contrary to the fire in the sublunary which is always mixed.<sup>14</sup> Celestial fire was called 'aether' by some<sup>15</sup> and at least Chrysippus spoke of 'the purest part of the aether.'<sup>16</sup> The superlative suggests a notion of gradation of fire according to the degree of admixture, from the most pure and unmixed state in the outskirts of the universe to fire mingled with the other elements the more we approach the terrestrial realm. The idea of a gradation of materiality as fire descends from the supralunary to the sublunary is given further support by the Stoic view that the elements were made out of fire by alteration and will eventually return into fire by resolution.<sup>17</sup> Chrysippus called precisely that purest kind of primordial and end-state fire 'light.'<sup>18</sup> This goes a long way towards explaining Nyssen's view of the different varieties of fire in the supralunary divided according to their density and weight, i.e. according to the two indexes of fire's 'materiality.' Moreover, Chrysippus' identification of pure fire with light seems to accord nicely with Nyssen's exegesis of primordial light *qua* pure fire. Yet, Stoic physics fails to give full support to Nyssen's theory. Nyssen's exegesis does not support the Stoic conclusion of a universal conflagration, which means that the Stoic eschatological vision of a pure fire/light does not resonate with Nyssen's cosmology. Nor does the Stoic model of cosmogenesis, in which the elements proceed from primordial fire by alteration, match Nyssen's diakrisis-cosmogony (in which the elements proceed from the *tohu wa-bohu* by separation). Stoic pure fire/light covers a broader range of material phenomena than Nyssen is willing to concede. We therefore need to continue the search.

This brings us to the Platonic camp and its fundamental tenet, derived from the *Timaeus*, that all material things are compounds of the four elements, including the heavenly bodies which are made 'mostly out of fire' (40a). By the time of Nyssen, there was quite some Stoic water poured into that old Platonic wine; and the mix was stored in Aristotelian wineskins. We thus see the early Plotinus reprising, in an aesthetic context, Aristotle's view of fire as the subtlest element and closest to the forms:

It [sc. fire] has the role of form (*taxin eidous*) in relation to the other elements, highest in position, finest of the other bodies, being as close as possible to the incorporeal, and is alone not receptive of the other elements, though the others receive it. For it heats them, but is itself not cooled, and is primarily coloured, whereas the others get the form of colour from it. So, it shines and glows as if it were form (*hōs an eidōs on*). (*Enn.* I.6.20-5 tr. Gerson)

The late Plotinus refines and further develops this doctrine, adding Stoic colorations to its Aristotelian backdrop. In his cosmological treatise (*Enn.* II.1 *On Heaven*), Plotinus explains that the natural place of fire is in the highest regions of heaven (II.1.3); that celestial fire differs from the common flame (*phlox*) of our experience which needs constant nourishment and burns (II.1.4); that this difference corresponds to the different constitution and behaviour of bodies in the supralunary and the sublunary (II.1.5); that the stars are made *wholly* out of pure, celestial fire, which is corporeal 'light' (*phōs*) (II.1.6); and that the mixed constitution of

<sup>14</sup> See Stobaeus *Ecl.* I.213.15-21 (=Long and Sedley 46.D).

<sup>15</sup> See Diogenes Laertius *Vitae* VII.137 (=Long and Sedley 47.B).

<sup>16</sup> See Diogenes Laertius *Vitae* VII.139 (=Long and Sedley 47.O).

<sup>17</sup> See Stobaeus *Ecl.* I.129.2-130.13 (=Long and Sedley 47.A). The idea of gradation of materiality is of course much older going back at least to Anaximenes who explained corporeality purely on the basis of the condensation and rarefaction of air, see Kirk, Raven and Schofield (1983), 144-53.

<sup>18</sup> See Philo *Aet.* 90 (=Long and Sedley 46.M).

the celestial bodies that the *Timaeus* seems to refer to is not a mixture of elements but of elemental tactile properties, like solidity (from earth), cohesion (from water), and lightness (from air) (II.1.6-7). Plotinus thus distinguishes clearly between fire in the sublunary (flame – *phlox*) and fire in the supralunary (light – *phōs*) (II.1.7).<sup>19</sup> The former (flame) bears all the attributes of Aristotle’s fire: it confines itself to the sublunary and is bright (*lampron*) and hot (*zesin*). But its powers die out (*maranomenē*) as it moves higher in the atmosphere. The celestial fire, on the other hand, bears all the characteristics of the Stoic pure fire, as even its name (‘light’) betrays: it radiates the purest light (*tou phōs parechontos to katharōtaton*); it obviously does not burn; its natural motion is circular (II.1.8); but most importantly, and in a striking similarity with Nyssen’s doctrine, it is distributed in different varieties in the heavens to which correspond different degrees of luminosity:

But as for the light in the heavenly region, some of it is variegated in proportions (*en logois*) in the stars so that it produces a difference in their colours (*chroais*) just as in their magnitudes (*megethensin*). The rest of the heaven is itself, too, of this sort of light (*phōtos*), but it is not visible due to the non-resistant fineness (*leptotēti*) and transparency (*diaphaneiai*) of its body, just as is the case with pure air, as well. And their distance (*to porrō*) should also be added to these factors. (*Enn.* II.1.7.43-9 tr. Gerson)

Plotinus’ view was further developed and explained by Proclus, who, in his great *Commentary on the Timaeus*, expounded the doctrine of varying degrees of materiality according to degrees of purity:

nothing is visible separate from fire, from which one might infer that all bodies participate in fire, but different bodies have different sorts of fire. For light (*phōs*) and flame (*phlox*) are not the same thing, nor is flame the same thing as burning coal (*anthrax*), but from higher up there is a deterioration (*huphesis*) of fire down as far as Earth. It proceeds from a more immaterial (*aūlotera*), purer and less corporeal condition until it gets to the most fully enmattered (*enulotata*) and densely packed (*pachutata*) bodies. (*In Tim.* II.8.20-7 tr. Baltzly)

We clearly stand in front of the doctrine that also explains the behaviour of Nyssen’s celestial light. The basic tenet of the doctrine is that there is a great distribution of species of fire in the universe as a direct correlation of each species’ particular composition (purity) and structure (density), which in turn determines each species’ location in heaven (natural place). To be absolutely clear, I am not here suggesting that Nyssen is reading Proclus, who appears on the scene a generation later. If anything, Nyssen is reading Basil who theorized primordial fire as ‘the most pure and unmixed and immaterial light’ (*Hex.* VI.2 *tōi katharōtatōi ekeinōi kai eilikrinei kai aūloi phōti*). But I am suggesting that Basil and Nyssen share a common point

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<sup>19</sup> Plotinus distinguishes here between two different uses of the term ‘light’: in one sense it denotes pure, *celestial* fire (i.e. the substance of the heavenly bodies); in another sense it denotes the luminous power or capacity of *any* kind of fire and has the same reference as ‘our,’ modern, light. In the former sense it is corporeal, in the latter sense it is incorporeal. It is a clear case of homonymy, see *Enn.* II.1.7.25-30. The former meaning of light as celestial fire Plotinus derives from the *Tim.* 39b: ‘the god kindled a light (*phōs*)..., the light that we now call the Sun.’ The Timaeian terminology finds parallels in the Homeric interpretative tradition, which denied that the sun was made of ‘fire’ (*mē einai pur ton hēlion*), being rather a ‘pure light’ (*alla phōs katharōtaton*), *Stob. Ecl.* I.25.6-7. See also ps.-Plutarch *De Homero* 105 Kindstrand (*ou pur estin ho hēlios all’ hetera tis kreissōn ousia*). If we compare the Homeric tradition with Plotinus’ terminology it is clear that there was a widespread notion of celestial ‘light’ as a luminous substance *different* from fire. How far one would drive the difference was debated. While Aristotle would claim that it is not *fire* at all (see the following line of the passage cited above from the *De Homero*), Plotinus would claim that it is not *sublunary* fire or ‘flame’ (*phlox*). For the hexaemeral terminology of celestial light see below.

of view and parallel doctrines, as well as various details of terminology – the ‘immateriality’ of celestial corporeal ‘light’ most notably – with Proclus, which cannot be accidental.<sup>20</sup> Nyssen’s physics of light has an undeniable Platonist ring, situating his terminology of the ‘immateriality of light’ somewhere between Plotinus and Proclus.<sup>21</sup> If so, then the following passage from Proclus’ *Commentary* is also helpful in deciphering Nyssen’s celestial physics:

enmattered (*enulon*) fire is one thing but immaterial (*aūlon*) fire is another – that is, it is immaterial because *compared* to the matter of the things in the sublunary sphere it is immaterial (*aūlon*) – and the one kind is destructible while the other is indestructible. While one kind is mixed with air, the other is pure. (In *Tim.* II.9.10-5 tr. Baltzly)

I consider this passage a fair approximation of Nyssen’s remark on the ‘immateriality’ of heavenly fire, which is the reason why I have translated *aūlon* as ‘pure.’

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<sup>20</sup> The multiplicity of philosophical (including Neoplatonic) influences of Cappadocian hexaemeral thought have been portrayed in their complex variety first by Robbins (1912) and more recently by Cöckert (2009) and, as regards Nyssen in particular, by Risch (1999).

<sup>21</sup> The most serious challenge against Plotinian and post-Plotinian influences in Basil and Nyssen is raised by John Rist, who, in several seminal papers argued that Cappadocian knowledge of Plotinian thought, direct or indirect, was very limited, suggesting instead a direct influence of Jewish-Christian Middle-Platonic sources, especially Philo and Origen, and a direct access of the Cappadocians to the Platonic corpus itself, see Rist (1981), (2000) and the overview in (1996), 397-401. I here concur with Rist’s argument, with one important caveat: the Cappadocians make limited *use* of the Plotinian theory of light. But this does not imply limited *knowledge* as well. The Cappadocians learn indeed from Origen and Philo how to read the Bible philosophically, including the idea of a physical world of gradating materiality in terms of purity, see e.g. Philo *Her.* 146, 152; Origen *DP* II.2.2, II.3.7, III.6.4. And they also learn from them how to understand the biblical language of ‘light’ as celestial fire, see Origen *DP* I.1.1-2 and 6, I.2.4-8, I.7.4. There is one exception. Philo and Origen do not seem to know of an ‘immaterial’ (*aūlon*) light. I could find no occurrence of *aūlon* connected to light in the Philonic corpus (TLG search), while Origen presses the opposite point, namely the ‘materiality’ of celestial fire/light, see *DP* I.7.5 GCS 92.10-1 (*nam licet aetherium sit corpus astrorum, tamen materiale est*), cf. also *DP* I.1.1 GCS 17.16 (*corporali lumine*). Having said that, Origen does allow for the same doctrine underlying Proclus’ ‘immateriality’ of light, using, however, a different terminology. In the Preface (§8) of the *DP* he speaks of *asōmaton* (*id est incorporei*) to denote the subtle aetherial substance of the demonic body, which ‘is by nature a fine substance and thin like air.’ Later he claims that the scriptural equivalent of the Greek term *asōmaton* is *acheiropoiēton*, see *DP* II.3.6 (*in fine*) *apud* 2 Cor. 5.1. Interestingly, Plotinus also insists on the corporeality of celestial ‘light’ (as fiery substance) compared to the incorporeality of its luminous power (‘light’ as quality of fire), see I.6.3.19 (*kai to pur auto para ta alla sōmata*), II.1.7.26 (*sōma*), IV.5.7.34 (*phōteinou sōmatos*), but at the same time, like Origen, tries to find ways of expressing its ‘immateriality,’ i.e. fineness and subtlety, compared to the other elements, see I.6.3.20-22 (*taxin eidous pros ta alla stoicheia echei, leptotaton tōn allōn sōmatōn, eggus on tou asōmatou*), III.6.6.41 (*feugon ēdē tēn sōmatos phusin*). It is clear that both Origen and Plotinus try to find ways of expressing the ‘immateriality’ of celestial fire without creating the wrong assumption that it belongs to the intelligible realm of the purely immaterial substances, escaping the physical universe. The term that the Cappadocians use for celestial light, however, is *aūlon*, which we also find in Proclus’ *Commentary*, e.g. *In Tim.* II.9.10. This speaks for a later *terminological* development and my suspicion is that Iamblichus, whom Proclus follows, might have had a role to play in that, cf. *De mysteriis* V.11.6: *aūlon pur* in the sense of ‘celestial fire.’ A very interesting hexaemeral parallel is Severian *In cosmogoniam* I.4 PG 65:434: *aūlon pur*. But Severian’s homilies were delivered during Lent 401, see the detailed analysis of Carter (2000), which is a date later than Basil and Nyssen and before Proclus. This reinforces my argument of an earlier (but post-Plotinian) Neoplatonic influence, for which I propose Iamblichus. Apart from this terminological affiliation, the Cappadocian physics of light deviates in a crucial respect from Plotinus’ and Proclus’ celestial physics (see right below), which forbids us to call it ‘Neoplatonic.’ Having said that, it is only by comparison to Plotinus and Proclus that we can retrospectively reconstruct in a meaningful way the Origenian–Cappadocian physics of light. That is why I give much more attention to the Neoplatonic theory of light than Rist would.

### 3. Cappadocian answers

There is one important detail which separates Nyssen from the Neoplatonic tradition. The major part of the *Apology* is a sustained argument for the principle of mass conservation in the universe in spite of (and at the same time because of) the continuous interaction of the four elements (§§28-63). A vital role is attributed, by the law of conservation to the hydrological cycle, i.e. the ever-recurring cycle of evaporation, condensation and precipitation of water through the mediation of the sun's heat (§§33-5). During its condensation, the water releases moist emissions in the form of exhalations that travel from the sublunary to the supralunary. The moist emissions result in an element exchange between the supralunary and the sublunary. The moisture that rises up to heaven nourishes the fire of the heavenly bodies (§§46-8, 53). This tells us that the celestial fire has a consuming nature, nourishing itself upon the exhalations that it receives from the sublunary. The theory of exhalations had wide currency in ancient physics. It had a Heraclitean flavour, echoing in several Stoic sources, and it appears to have acquired at least some support even within Middle-Platonic sources.<sup>22</sup> Plotinus seriously considers it but, for his own reasons, explicitly rejects it.<sup>23</sup> Basil, on the other hand, endorses it, and with it the un-Plotinian view that celestial fire is nourished by the moist emissions released during the condensation of water in the atmosphere.<sup>24</sup> Nyssen followed in his brother's footsteps, adding certain important clarifications to Basil's theory.<sup>25</sup> This raises the question why the Cappadocians chose to

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<sup>22</sup> On Heraclitus' theory of exhalations see 22 A 1 (9) DK; Kirk, Raven and Schofield (1983), 200-2. On its Stoic echoes see SVF II.446, 572, 612, 658. The Middle-Platonic source I am referring to is Atticus fr. 6.12-8, who ascribed to Plato the view that celestial bodies are subject to 'processes of material loss and accretion.' See the comments of Kalligas (2004), 258-259; Wilberding (2006), 158-60, 218-9, both with references.

<sup>23</sup> See *Enn.* II.1.3.23-30, II.1.4 and II.1.7.33-43, with the comments of Kalligas (2004) and Wilberding (2006) *ad loc.*

<sup>24</sup> See *Hex.* 3.5 on the general principle of fire consuming water and III.7 on the application of the general principle in the supralunary (theory of exhalations).

<sup>25</sup> See *In Hex.* 28 GNO 41.12-5 reporting on the general principle of fire's consuming nature. This is the view of Basil, as Nyssen remarks in the next line, and it is also Nyssen's view, see Risch (1999), 198 n.247. The rest of the *Apology* up to §63 explains in detail how the supralunary fire constantly consumes the moisture of the exhalations from the sublunary. §28 (GNO 41.15-42.6) introduces a *seeming* divergence from Basil's doctrine (cf. 29 GNO 42.7 *hupenechtheisan antithesisin*: 'implied opposition'), which was taken in secondary literature as introducing a *real* divergence from Basil's doctrine, see Robbins (1912), 49 (n.4), 55; Corsini, (1957), 96-101; DeMarco (2013), 345-52 and (2017), 83-4; O'Brien (2015), 10-11, 12-3. This reading of the *Apology* rests on a profound misunderstanding of Nyssen's *skopos* as meticulously shown by Risch (1999), 7-8, 198-9 n.251. The gist of the *Apology* lies elsewhere. Basil had already remarked in *Hex.* III.4-6, though not further explained, that the consumption of water by fire should not be understood in the sense of a complete annihilation (*ekleipsei*) of one element by the other, otherwise the theory of the elements would explain not the conservation but the dissolution (*dialusin*) of the universe. Basil's doctrine is reprised by Ambrose, *Exam.* II.3.12-14, with no further substantial advancement. It fell, then, upon Nyssen to explain *how* fire could consume water without the one element annihilating the other. Nyssen's laborious answer results in the formulation of the law of mass conservation from within hexaemeral physics (§§29-62). The law of conservation was already known in Greek physics, see Sambursky (1960), 7-8, 107-8; Long and Sedley (1987), §4, with comments *ad loc.* (pp. 25-7). It was based, however, on the axiom that 'nothing comes from nothing.' Nyssen undertook the valiant effort to prove that the law was defensible from within the scriptural framework of *creatio ex nihilo*. This is the reason why the idealist theory of matter is so important for the hexaemeral exegesis: if the ingredients of mass (i.e. weight, density, extensionality etc.) are qualities, and hence intelligible objects ('pure concepts'), they pre-exist and outlast material change. The combination of the ingredients may change, and with it the distribution of mass in the universe. But the ingredients themselves remain unchanged, which means that mass 'as such' remains

deviate in this respect from Neoplatonic physics. The reasons have to do with their hermeneutical – viz. scriptural – commitments.

It appears that long before the Cappadocians a hermeneutical tradition had been established according to which there was no exception to fire's caustic power in biblical physics. The tradition is summarised in a passage from Origen's *De Principiis*, which gathers several biblical locutions denoting the burning power of all fire, even when the language is stretched to include *intelligible* or *divine* fire.

For the divine word calls God a fire, when it says, 'Our God is a consuming fire' [Dt. 4:24, 9:3; Heb. 12:29]. And concerning the substance of angels, it says as follows, 'Who makes his angels spirits and his ministers burning fire' [Ps. 104:4; Heb. 1:7], and in another place, 'The angel of the Lord appeared in a flame of fire in the bush' [Ex. 3:2]. We have, moreover, received a command to be 'aglow with the Spirit' [Rom. 12:11], by which without doubt the Word of God is shown to be fiery and hot. The prophet Jeremiah also hears from him who gave him the oracles, 'Behold I have given my words into your mouth as a fire' [Jer. 5:14]. As God therefore 'is fire,' and the angels 'a flame of fire,' and the saints are all 'aglow with the Spirit,' so, on the contrary, those who have fallen away from the love of God are undoubtedly said to have cooled in their love for him and to have become cold. (DP II.8.3 tr. Behr)

The contrast with the Plotinian physics of fire is striking. For Origen, even the purest kind of fire burns. For Plotinus, the higher a fire is situated in the spheres of the universe the purer it is and the less it burns. Plotinus seems here to articulate a general premise of Greek thought, regardless of the particular details of the celestial physics of each school. The principle can be traced at least back to Theophrastus, who in his special treatise *On Fire* reports it as self-evident. The *De igne* begins with the fundamental observation that all fire needs a material substrate to burn for its subsistence. The question that follows is what happens in the supralunary. *Given* that the stars appear to be fire-like, but their activity does not appear to burn, can we still say that they are truly made out of fire?

In short, everything that is burning (*pan kaiomenon*) is, in a sense, in generation, comparable with motion, for which reason it somehow is destroyed as it is created, and with the exhaustion of the fuel (*to kauston*), it itself is done away with. The ancients were referring to this when they said that fire always seeks nourishment (*trophēn aei zētei to pur*), being unable to persist without fuel (*aneu tēs hulēs*). Hence it seems foolish to speak of fire as a first substance and original element if it cannot exist without fuel (*chōris hulēs*). For in that case it is not elemental nor prior to the substrate (*hupokeimenou*) and the fuel (*hulēs*), unless there is some such substance (*toiautē phusis*) in the first heavenly sphere itself (*en autēi tēi prōtēi sphairai*) which is pure (*katharan*), unmixed heat (*amikton thermotēta*). In that case it would no longer burn (*ouk an eti kaioi*). But burning is the essence of fire (*puros*), unless indeed there are several different kinds of fire, one pure and unmixed (*kathara kai amiktos*), an element, there other located in the earth's sphere, mixed (*memigmenē*), and always in generation. (*Ign.* 3-4 tr. Coutant)

We can see in this passage the premise that prompted Plotinus to theorize the pure, unmixed fire of the stars as qualitatively different from sublunary fire: if it does not feed, it does not burn. And since celestial fire does not behave like *sublunary* fire he preferred to name it differently.<sup>26</sup> It is the 'immaterial,' though still corporeal, 'light.' It is the same logic that

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constant. Since Nyssen derives the idealist theory of matter from Basil too, see *Hex.* I.8, II.3 (and my discussion in the previous chapter), there is no substantial divergence between Basil's and Nyssen's physics.

<sup>26</sup> To be absolutely clear, Plotinus excludes only the caustic effect from celestial fire. He does accept that celestial fire generates heat, which enables him to regard it still as a species of fire. But the heat in question is of a

prompted Aristotle to abandon the talk of heavenly *fire* and speak instead of a *fifth* element: if what is up there does not behave like fire *at all*, then it is not fire and should not be called that.<sup>27</sup> It is unclear where exactly the Stoic sources stand in that debate.<sup>28</sup> Some sources adopt a more Heraclitean tone and claim that celestial fire feeds and burns.<sup>29</sup> Other sources suggest that it behaves like Aristotle's fifth element or Plotinus' immaterial light.<sup>30</sup> The divergence within the school is reflected in how each tendency theorized the fire of the conflagration. The line attributed to Cleanthes spoke of 'flame' (*phloga*), which was the term for a consuming and burning fire.<sup>31</sup> The line attributed to Chrysippus spoke of 'light' (*augēn*), suggesting that it no longer consumes and burns.<sup>32</sup> In this context, the hexaemeral authors sided, against the tide, with the Heraclitean tradition.<sup>33</sup> There is no reason to explain this adherence other than the biblical language of fire. As we saw, Origen affirms that pure fire burns, hence is truly fire. We find the exact same doctrine in Philo, who asserts the consuming

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different kind. Plotinus speaks of 'a gentle warmth' (*Enn.* II.1.7.25-6 *thermon de prosēnōs monon*), which as Wilberding (2006), 216-7, rightly argues, is Plotinus' terminology for 'vital heat.' The difference between caustic and vital heat is that the former converts fuel into fire while the latter produces growth and generation, see Wilberding (2006), *ad loc.*, with references to which the above quoted passage from Theophrastus must be added. The sources mentioned anticipate or build upon Theophrastus' explanation (or a similar one).

<sup>27</sup> Contrary to Plotinus, Aristotle thought that the substance of the stars does not generate any heat at all, see *Cael.* II.7; *Meteor.* I.3. For his explanation of vital heat see *Gen. anim.* II.3: it is a property of pneuma which is analogous but not identical to the substance of the stars. Thus, Aristotle's fifth element lacks the most basic characteristic of fire (i.e. heat), it cannot be classified under 'fire' any more.

<sup>28</sup> The ambivalence of the available sources has been pointed out by Boyancé (1936), 65-78 and Hahm (1978), 65-9.

<sup>29</sup> See Aetius *Placita* II.17.2 and 23.5; SVF 2.446 (=Galen *De tremor.* VII.617), 572 (=Cleomides *Caelest.* I.8.79-99 = Posidonius fr.289 Theiler), 612 (Philo *Aet.* 86). The principle is expressed in Plutarch *Quaest. Conv.* VII.4 (703A): fire is nourished by itself (*kinoumenon te kai trephomenon di' hautou*). This does not mean that fire nourishes fire but rather that fire seeks its fuel by its very nature, see Cicero *DND* II.23 (*cietur et agitur motu suo*). See, however, my remarks in the footnote below on the fire of conflagration.

<sup>30</sup> See Lapidge (1973), 255-7: Stoic celestial fire exhibiting the characteristics of Aristotle's fifth element, causing ambiguity as to the differences between Stoic and Aristotelian 'aether.' On Plotinian celestial fire see *Enn.* II.1: its natural motion is circular; it does not burn; it is quasi-material. These are the common features of Stoic 'aether' (in at least one version) and Aristotle's fifth element.

<sup>31</sup> See Philo *Aet.* 90 (=Long and Sedley 46.M). A similar tradition is also attributed to Zeno *apud* Alexander Lycopolis 19.2-4 (=Long and Sedley 46.I).

<sup>32</sup> See Philo *Aet.* 90 (=Long and Sedley 46.M). Long and Sedley (1987), §46.M, in their comments (p. 278) interpret Chrysippus' 'light' as 'pure fire' and argue for 'the essential unity of all fire' in Stoic physics (46.D, vol. 2, p. 273). This would be possible if pure fire and pure light are both aether in varying degrees of density: the compression of aether kindles fire; the dispersion of aether in space gives the transparent (and as such invisible) light of heaven, as Plutarch in *De facie* (928c = SVF II.668) tells us. If this is the general principle, then 'flame' (Cleanthes) and 'light' (Chrysippus) denote simply two different states of condensation of pure fire. Flame, which is consuming, is the last and the first state of elemental fire. Light is the state in which the dispersed aether rests tranquil in itself, until it begins condensing again. Perhaps this is what is meant under the allegorical expression that 'Zeus [sc. flame] withdraws into providence [sc. its pre-cosmic state], whereupon both, having come together, continue to occupy the single substance of aether,' see Long and Sedley 28.O.4 and 46.O. In this pre-cosmic state, aether would not need to consume anything. The need for consummation appears with the change of aetherial light into flame through compression with the contemporaneous emergence of air and so on. If that is a plausible reading of the fragments, see e.g. Long and Sedley 46.G.2 and 47.A, the essential unity of all fire is indeed preserved in the Stoic system, while all elemental – i.e. intra-cosmic – fire has a consuming nature.

<sup>33</sup> This does not mean that I classify the Cappadocian physics of fire as 'Stoic' because, if my analysis is correct, the Cappadocians follow the elemental theory of Aristotle and the theory of aether of the *Epinomis*. With these caveats, the Cappadocians share with the Stoics the view that celestial fire is a consuming 'flame' (*phlox*).



nature of *all* fire<sup>34</sup> and follows the Stoic view that celestial fire is burning fire.<sup>35</sup> The reason why we do not feel its caustic effects is not intrinsic but extrinsic: it is the cool-down effect of the interposed air.<sup>36</sup> Thus, all biblical language of fire entails a burning material and its caustic effects, even when the language is stretched to include pure (corporeal) light or analogically applied to God.<sup>37</sup>

The Cappadocians appear hermeneutically committed to the Philonic-Origenian twist on celestial physics, while maintaining a distinctively Neoplatonic terminology. Basil who first speaks of the celestial ‘immaterial light’ adopts the Philonic view of the sun being a most burning fire (*phlogodestatos*).<sup>38</sup> He moreover argues that it is only logically (though not empirically) possible to separate the illuminating from the caustic power of fire. That is at least what the thought experiment from miracles (burning bush) and other possible worlds (eschatology) suggests:

It is inconceivable for you to separate the burning power (*kaustikēn dunamin*) of fire from its brightness (*lamprotēs*); yet God, wishing to turn his servant back by an incredible spectacle, placed a fire in a bush, which was active only by its brightness (*lamprotētos*) and had its power of burning (*tēn tou kaiein dunamin*) inactive. This, too, the psalmist testifies when he says: ‘The voice of the Lord dividing the flame of fire.’ Whence also in the requital for the actions of our lives a certain saying teaches us in cipher (*logos tis hēmas en aporrētōi paideuei*) that the nature of fire will be divided, and the light (*phōs*) will be assigned for the pleasure of the just, but the pain of burning (*to tēs kauseōs odunēron*) for those punished. (*Hex.* VI.3 GCS 92.1-9 tr. Way, amended)

Nyssen, who also speaks of supralunary ‘immaterial light,’ follows in the footsteps of Origen. During the exegesis of day two he repeats the celebrated imagery of God as a ‘consuming fire,’ applying it to the divinity.<sup>39</sup> Like Origen in the *De Principiis*, he finds no reason for separating the two necessary features of fire, brilliancy and burning, from one another, not even when the language of ‘fire’ is stretched to include purely immaterial states like the light of the Holy Spirit.<sup>40</sup> Nyssen clearly feels the weight of a long interpretative tradition supporting his exegesis. He thus boldly suggests that the Spirit of God mentioned in *Gen.* 1:2a stands to the spiritual waters in the same relation as celestial fire stands to the moist exhalations of the sublunary world. The implied analogy drawn from the physics of the hydrological cycle suggests, to the intelligent reader, that the consummation of the soul by divine fire brings not destruction but transformation and regeneration. All this goes beyond

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<sup>34</sup> On the consuming nature of fire see *Abr.* 140; *Somn.* II.212. on the terminology see *Aet.* 86: the burning species of fire is called ‘flame’ (*phlox*).

<sup>35</sup> Celestial fire is *phlox*, see *Cher.* 25-6; *Deus* 78.

<sup>36</sup> See *Deus* 79.

<sup>37</sup> On the burning nature of all biblical fire, whether archetypical or derivative, divine, angelic and celestial see Origen *DP.* I.1. The Origenian interpretation echoes in all subsequent exegesis, see e.g. Didymus *Comm. Gen.* 233.12-234.4 *ad Gen.* 15:17 (burning celestial and divine fire); Ambrose *Exam.* II.3.13-4 (burning celestial aether); Severian *In cosmogoniam* I.4 PG 56:434 and IV.6 PG 56:464 (angels as burning fire). We can now clarify the terminology: the scriptural language of light exhibits the same homonymy as the language of Plotinus, denoting here pure (celestial) fire (i.e. a fire that *is* ‘light’) and there any fire’s luminous power (i.e. a fire that *has* light). But while for Plotinus celestial fire is not burning flame, for the scriptural exegetes it is. Celestial flame, however, exhibits different degrees of causticity and luminosity than sublunary flame due to the finer material that it burns, see right below.

<sup>38</sup> *Hex.* VI.8 GCS 102.9. See also III.7, VI.10.

<sup>39</sup> See *In Hex.* 19 GNO 32.7-10.

<sup>40</sup> See *In Hex.* 19 GNO 31.15-9.

the premises warranted by Neoplatonic physics, which does not theorize celestial fire as having a consuming activity.

#### 4. Hexaemeral physics

The hermeneutical twist of the hexaemeral authors has further consequences. It leads to a more parsimonious account of celestial physics requiring no deviation from the theory of the four elements, e.g. through the introduction of a fifth element or the stipulation of a *sui generis* species of celestial fire. It also has the great merit of extending the principles of sublunary fire to the supralunary. The latter extension allows us to learn more about how Nyssen would explain the different physical characteristics of various kinds of light. For the relevant doctrine we need to turn again to the *De igne*. Theophrastus there explores further the relation between the fuel and the light of a particular species of fire. Based on the principle of purity, Theophrastus argues for a comprehensive chain of causation that binds fuel, fire and light together. This creates a direct, causal link between the qualities of the fuel involved in the reaction and the qualities of the light produced. In other words, the physical characteristics (colour, brightness, irradiance etc.) of a fire's light are directly dependent on the degree and purity of moisture contained in the inflammable material that sustains the fire's activity. The purer and more unmixed (hence rarer, lighter etc.) the fuel is, the greater the brilliancy of the light it gives. To put it in more Neoplatonic terminology, the more 'immaterial' the fuel, the more 'immaterial' the light.

Since the inflammable and combustible substances are numerous and various, their qualities are different, and one cannot do what another can: for example, charcoals (*anthrax*) cannot give light (*phōtizein*) as flame (*phlox*) can, nor does a flame give the same light as a lamp (*luchnos*), nor does the lamp give the same when dying down as when it is flaring up. The purer (*hosōi dē katharōtera*) the flame, the clearer it burns (*tosoutōi mallon*), since it contains no earthy (*geōdes*) or liquid (*hudatōdes*) matter which may block it and from which smoke (*kapnos*) and exhalation (*anathumiasis*) may arise. That is why the flame (*phlox*) from green wood is redder than that from dry wood; it contains more moisture through which the light shines and gets its colour (*chroian*), as happens with the sun when the air is dense (*pachus*). Charcoal (*anthrax*) produces only a little flame (*phloga*) because it does not contain much moisture (*hugrotēta*) to be volatilized (*exaeroumenēn*). When the moisture is being burned (*puroumenē*), we have flame (*phlox*). (*Ign.* 30-1 tr. Coutant)

We can now begin to see the full picture of Nyssen's physics of light in the *Apology*. It is a synthesis of Stoic physics (celestial flame) with Aristotelian principles (theory of the four elements) embedded in a pre-modern cosmological framework (varying degrees of materiality from the centre to the limits of the universe), expressed in Neoplatonic terminology ('immateriality of light'), carrying forward the Philonic-Origenian legacy of hexaemeral hermeneutics in the context of fourth century post-Nicaean orthodoxy. The fundamental tenet of Nyssen's physics of light is that all light, whether in the sub- or the supralunary, is the direct consequence of the quality of the fuel that its productive fire uses to sustain itself. What the fuel is in the case of celestial fire, we have already seen. It is the exhalations of the vaporized water coming from the earth. Thus, the brightness of the stars is the direct correlation of the subtlety of the material that sustains it, namely the purest kind of moisture carried to the supralunary by the exhalations of vaporized water. We can even go a step further and supply the final details of the picture that Nyssen sketches but never fully

draws. We may deduce that once the moist and dry exhalations reach the hot and dry aether of the supralunary a process of separation begins under the effect of aether's heat. The moisture that is gradually released travels through the vast regions of space under the motive power of aether's heat to the planets and the stars to be consumed. The dry part that is left behind falls down on earth under the power of gravity in the form of dust-like particles (*konis*).<sup>41</sup> That means that the farther a heavenly body is positioned in the sphere of the universe, the more complete the process of separation between the moist and dry element and the purer the quality of its fuel will be. That further suggests that the supralunary is not an entirely homogeneous space, as sometimes assumed, but exhibits its own varying degrees of heat and moisture. The latter insight brings us back to the old suggestion of Chrysippus about the variegated purity of the aether of the supralunary, revamped in a biblical physical universe. The result is a fascinating relation of dependence between natural place, materiality and luminosity: the higher a fiery body is positioned in the sphere of the universe, the finer (i.e. purely moist) the physical characteristics of the material it consumes, and the finer (i.e. purely bright) the colour, irradiance and clarity of the light it produces.<sup>42</sup>

## 5. Hexaemeral hermeneutics

We have come far with Nyssen's physics of light. Let us now go a bit further and consider its exegetical consequences. The connecting thread of Nyssen's physical world is the law of universal mass conservation. The world is a continuum in which all elements interact with each other and there is no part of the world that is separated from the rest. This unity is the outcome of the constant interaction of celestial fire, which reigns in the supralunary, with the hydrological cycle, which governs the laws of change in the sublunary. The hydrological cycle requires water, fire and air (for water to evaporate) and earth (for water to return to a basin). Celestial fire again requires the hydrological cycle (that sustains it). Thus, the existence and sustenance of heavenly bodies requires the synergy of the four elements. In Nyssen's hexaemeral exegesis, the creation of the four elements is explained through a process of gradual separation of one element from the others over a period of three cosmic days: fire first (§§10-5), then aether and air (§§18-25), then water and earth (§§26-63). That means that the exegesis of the fourth day of creation (§§64-73) continues the sequence of events that took place on days one to three. Not because Moses says so, but because this is the natural order of things, the *akolouthia* of nature (§74). Moses simply wrote down this *akolouthia* in the form of a hexaemeral narrative. It is this *akolouthia*, the laws of physics, that the reader is called to retrieve by contemplating nature through the mirror of Scripture. If the contemplation is successful, the reader will discern *that* there is a *logos* guiding the heavens (§ 69 *hoti pantōs esti tis logos*) and *that* this *logos* manifests through the chain of natural events as material causality (§ 71 *tēs tōn ontōn ktiseōs akolouthian tina*). *What* the exact

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<sup>41</sup> See Nyssen *In Hex.* §§38-40, 46-8 ≈ Basil *Hex.* III.7 GCS 49.17-50.16 (including the same example of the burning lantern).

<sup>42</sup> The synthesis of the various theories results in a distinctive (from other schools) and coherent theory of light. This speaks for originality induced by certain hermeneutical commitments. The result is not a cocktail of different theories accommodated to serve scriptural exegesis but an altogether *new* theory. This was necessary if the original plan of defending the possibility of hexaemeral physics against erudite readers of Scripture like Celsus and Galen was ever going to succeed.

structure of the celestial logos is, remains, however, beyond the ability of the reader to grasp. We may understand the laws of celestial physics – the physics of light *par excellence*: the immeasurable variety of luminous substances circulating the heavens, their physical properties, the factors of their luminosity, their relation of dependence upon the other elements – but we will never comprehend why it is these laws and not others that reign in nature, why it is this *logos* and not another that defines the individual structure of a star, the physical properties of its light, or the current configuration of the elemental distribution in the world (§70 *mē dunamenos exeurein ton logon, pōs...*; § 71 *ton logon [...] idein [...] adunatei*). Bearing this in mind, we may finally understand the inner logic of Scripture, the *akolouthia* of the creation narrative, why there needed to be an interval of three days between the light of the first days and the heavenly bodies that exhibit it in the fourth. The interval was necessary for the four elements to appear and start the cycle of their inter-transformations, without which there could be no fire and hence no light in the universe. And since there can be no light without fire and no fire without fuel, the four days cannot denote intervals of time, but only logical steps necessary in reconstructing the *akolouthia* of nature. Seen from a cosmic perspective, the four elements must always co-exist and constantly interact with each other.

If this is a plausible interpretation of the *Apology*, it reveals something of the beauty and erudition of Nyssen’s hexaemeral exegesis. Nyssen is not interested in repeating Basil’s project but in explaining it. He avoids a second version of what we already know, namely of the encomium of light. Instead, he gives us the physics that explain the variety and beauty of light itself, and in so doing fulfils the very purpose of light’s encomium: to lead us through the contemplation of the heavens to the apprehension of the divine logos shaping and sustaining the world. But Nyssen does not stop at that. His physics of light requires a hexaemeral exegesis that links the different stages of creation intrinsically with each other. The physics of light explains not only how light works, but also why the special work of each day of creation cannot actually exist without the work that comes before and after. Nyssen’s analysis of the four elements and the cycle of their mutual inter-transformations reveals heavenly light to be the outcome of a global synergy, so that there is no feature or part of the world that does not contribute to the other, ‘for the world is continuous as a whole (*suneches esti to pan en heautōi*) and the whole (*to holon*) is made up by parts (*ek merōn*)’ (§48). Nyssen’s hexaemeral exegesis tries to make sense of the world as a meaningful whole or there is no world at all. The contemplation of light helps us intuit that there can be but one act of creation, that the whole cosmos is created from the outset and nothing was left out from the very beginning. But we are feeble (§ 71 *hē ptōcheia tēs phuseōs hēmōn*) and cannot sustain this vision for long (§ 70 *ho nous iliggiai*). That is why Scripture narrates the cosmogenesis step by step (§ 71 *kata tēn ektetheisan para tou nomothetou taxin*), hexaemerally, training the mind (*dia tinōn stochasmōn*) to perceive gradually the divine logos guiding the All. Nyssen’s contemplation leads us through the All by telling the story of light. A story of light worthy of a true hexaemeral exegete.

So far, Nyssen has told us the story of light from within (*ad intra*). He has shown us light’s substance (fire) and structure (a power of fire), its essential quality (brightness), how this quality comes about (separation of fire from the other elements), how its attributes are defined (luminosity as a function of fire’s purity), and how its activity is sustained (interaction of fire with the other elements). In other words, he has shown us the internal manifestation

of the *logos* of light, how light's innate *logos* becomes embodied as brightness. It is now time to follow the other side of the story of light and see how light's *logos*, its essential brightness, manifests out in the world (*ad extra*). The exteriorization process of the *logos* of light requires two things: a vehicle and a recipient. The former is the light-ray, the latter the medium. I shall take them in order.

## II. Going ballistic: The singularity of the light-ray

The *Apology* mentions the light-ray (*aktis*) in several different contexts. The ray theory helps explain the magnitude of the sun (§32), the evaporation of surface water (§33), the infiltration of space with light (§48), the distance of the stars (§70) and the light of the moon (§70). The references explicitly presuppose some version of a ray theory. But the systematic exposition of the theory itself and its details are left for the intelligent reader to figure out. That is what I here propose to do. In what follows, I shall attempt a systematic reconstruction of the ray theory underlying the *Apology*, pieced together from clues scattered here and there.

### 1. Rectilinearity

The first feature of the light-ray is that it is rectilinear. We learn this indirectly from Nyssen's disquisition on the magnitude of the sun which is mathematically inferred from the conoid shape of the shadow of the earth.<sup>43</sup> The passage in the *Apology* is an abbreviated version of the astronomical theory expounded in the *Opificio* which runs as follows:

For just as those skilled in astronomy tell us that the whole universe is full of light (*phōtos katapleōn*), and that darkness (*skotos*) is made to cast its shadow (*aposkiazomenon*) by the interposition of the body formed by the earth; and that this darkness is shut off from the rays of the sun (*tēs hēliakēs aktinos*), in the shape of a cone, according to the figure of the sphere-shaped body, and behind it; while the sun, exceeding the earth by a size many times as great as its own, enfolding it round about on all sides with its rays (*pantachother autēn tais aktisin en kuklōi periptussomenon*), unites at the limit of the cone the concurrent streams of light (*tas tou phōtos sumbolas*); so that if (to suppose the case) any one had the power of passing beyond the measure to which the shadow extends, he would certainly find himself in light unbroken (*mē diakoptomenōi*) by darkness. (*Opif. hom. XXI.3 tr. Wilson*)

The passage does not explicitly say that the rays of the sun travel in straight lines. But this is clearly presupposed by the mathematics that explain the shape of the earth's shadow. Nyssen is interested neither in the astronomical theory as such nor in its mathematical proof. They are full of details that are superfluous for hexaemeral exegesis, as Basil had already remarked.<sup>44</sup> Basil's statement is fully justified in view of his largely uneducated audience, and Nyssen, who is addressing the learned, is not deviating from the basic principle by providing the basic outlines but not the detailed explanation of the theory. To the educated readership the astronomical theory was well known and the information missing easily accessible from

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<sup>43</sup> See *In Hex.* 32 GNO 45.15-20.

<sup>44</sup> See *Hex.* IX.1.

multiple sources.<sup>45</sup> Calcidius, who is one of the possible sources available and who provides the astronomical theory and its mathematical proof in detail, also clarifies that the mathematical proof requires the light-ray to be rectilinear:

The rays of the luminescent celestial fires travel in straight lines (*ignium lucem praebentium radii directi feruntur*), shaping variously the shadows cast by the intervening bodies. [...] Thus whenever the sphere radiating light has the greater magnitude and the illuminated one the smaller [...] the shape of the shadow will be conical. (In *Tim.* 89-90 tr. Magee)

## 2. Light mechanics

The second feature of the light-ray is that it exhibits mechanical properties. This is, again, an indirect inference, this time though derived from the presuppositions of Nyssen's theory of lunar illumination. I here repeat the relevant passage (already quoted):

such is the moon's median nature (*mesē phusis*): when obscured, it nevertheless retains the same capacity for light (*tēs te alampous kai tēs phōtistikēs dunameōs kata to ison metechousa*). The moon's dense composition blunts its lustre (*lampēdona*), but the reflection of the sun's rays (*tōi de antiphōtismōi tēs hēliakēs aktinos*) do not alter its luminous nature (*phōtistikēs phuseōs*).

The passage clearly states that the light of the moon is the result of the combined action of the sun's light with the moon's composition. When the sun's rays hit the surface of the moon the light is reflected (*antiphōtismōi*). How exactly this reflection is justified the *Apology* does not say. But we can supply the details if we allow for intertextual evidence from Nyssen's other works.<sup>46</sup> A look at Nyssen's corpus shows that the term *antiphotosmos* of the *Apology* (70 GNO 77.12) accords perfectly with the term *anaklasis* of the *De Anima et Resurrectione* (32C): they both denote the reflection of the light of the sun by the moon. If so, we can fill in the details by collating the information we are given in both texts. The *Apology* informs us that the fiery substance of the moon is so weak that its luminosity remains practically ineffective (*alampous*). The *De anima et resurrectione* picks up the thread and explains that even if the moon has no power to illuminate by itself (*apheggē kata tēn idian phusin*) it still retains something of the inherent luminosity of its fiery substance: it is the glittering colour of its surface (*stilbontos*), which bestows the properties of a mirror to the moon's surface (*hōs epi tōn katoptrōn*). This mirror-like property allows for the rebounding effect of the sunrays. We can derive the same doctrine from another text, the *De tridui spatio*, which describes the

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<sup>45</sup> For the astronomical theory see Aristotle *Meteor.* I.8 (345b1-9); Posidonius frs 9 and 19 EK; Cleomedes *Caelest.* II.2.19-30 Todd; Plutarch *De facie* 932e (59.20-2 Pohlenz); Plinius *Nat. hist.* II.49-52; Alexander Aphrodisias *In Meteor.* A.8 (38.8-13 Hayduck); Calcidius *In Tim.* 90. For the mathematical proof see Aristarchus *De magnitud.* 2; Cleomedes *Caelest.* II.6.79-108 Todd; Calcidius *In Tim.* 89-90.

<sup>46</sup> See *An. et res.* PG 46:32B-33B; *Trid. spat.* GNO 297.6-298.3. Risch (1999), 226-7, objects against a combined reading of these texts arguing that Nyssen employs two different astronomical models. The *Apology* adopts the rather Posidonian model of mixture (*sugkrasis*) of the light of the sun with the inherent but latent luminosity of the moon, a model which is deemed incompatible with the theory of reflection, see Cleomedes, *Caelest.* II.4, esp. lines 21-32. The *An. et res.*, on the other hand, clearly adopts the reflection theory (*anaklasis*). Risch explains the inconsistency away by claiming that Nyssen is 'completely indifferent' (völlig unbekümmert) to the physics of the light-ray that he uses here and there. As I show, Nyssen is not inconsistent and a combined reading is possible.

moonlight as the combined effect of the sun's rays with the moon's lustre (297.14-5 *plērōtheisan tais augais tēs hēmeras tas par' heautēs lampēdonas summixai*).<sup>47</sup> All this is textual evidence enough that the rectilinear ray is a substantial entity with its own mechanical properties. It creates a physical impact on the surfaces that it strikes, being forced to rebound on dense surfaces with mirror-like (i.e. glittering) properties or to penetrate the surfaces of non-opaque bodies, according to the degree of their density.<sup>48</sup> This means that the light-ray has a physical reality of its own, being a substantial entity in nature and not a mere mathematical abstraction.

### 3. Light kinetics

Does the light-ray travel? And if so, how fast? Nyssen is not explicit on this point and the information we get from the *Apology* is unclear. During the exegesis of the first day we are told that elemental fire is swift (*tachei*) and agile (*eukinētōi*), having a sharp (*oxeian*), upward (*anōpherē*) and ever-mobile (*aeikinēton*) nature (§§12, 14). When fire was separated from the other elements

it leaped up (*proexēlato*), shot out like an arrow (*ektuxeuthen kathaper ti belos*), to the high and light region by virtue of its natural motion. It traversed the perceptible universe just like thought (*isa noēmati*)... (*In Hex.* 14 GNO 25.1-4, my translation)

The passage attributes a special mechanical status to elemental fire. It has a natural projectile motion moving at an enormously high speed. The comparison with thought does not mean that fire is an intelligible entity, but that it moves with an extreme velocity, like the speed of thought, i.e. occupies space instantaneously. There is a resemblance, in the sense of a loose analogy, with the speed of light in contemporary relativity theory, as the limit of spatio-temporal motion. It is then no surprise when the *Apology* tells us that once the fire leaped forth

everything was immediately (*euthus*) surrounded by light. (*In Hex.* 10 GNO 20.17, my translation)

How are we to understand this *euthus*: is it that light flows out from fire at an enormously high speed, like the speed of fire, or is it because light is a static extension of fire, appearing

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<sup>47</sup> I am here reading *summixai* in the sense of 'joining forces'; 'be formed by combination'; 'happening together' rather than in the stronger sense of 'mix together' or 'commingle.' But even the stronger reading is possible, in which case the doctrine at hand would imply a model of *sugkrasis*. The *sugkrasis* model does not have to be incompatible with the *anaklasis* model, as Risch (1999), 226-7 suggests. Kidd (1988), 475-6 (comm. on fr.123), has argued that 'there may have been different variations of the theories. For example Macrobius, [...] seems to combine a reflection theory with a Posidonian semi-penetration theory of solar light.' I would be very willing to accept that Nyssen's theory employs such a mixed model. My difference with Risch would then be whether the *anaklasis* and the *sugkrasis* model are incompatible with each other, as e.g. Cleomedes thinks, or whether they are compatible, as Macrobius suggests. Having said that, the difference is of little importance for the argument I am making here. Whether rebounding on the moon's surface (reflection model) or penetrating the moon's surface (blending model), the light ray has clearly mechanical properties.

<sup>48</sup> In the *sugkrasis* model the moon is permeated by the light-rays but not totally. Cleomedes, *Caelest.* II.4.34-41, uses the analogy of a sponge absorbing water.

and disappearing together with fire?<sup>49</sup> The problem is that when we are dealing with such high speeds, at the verge of the conceivable, it is linguistically impossible to verify the difference between an instantaneous motion (requiring an interval of time conceivable only in thought) and a simultaneous presence (requiring no interval of time whatsoever). The immediacy of light could mean both. Language here will not help, and we must once more rely on intra- and intertextual evidence.

On two occasions Nyssen uses verbs that denote locomotion in relation to the light-ray. He speaks of the light-ray 'streaming in' (*eischetheisa*) a dark space (§48); and he assumes that the light-ray weakens in power the more distance it covers (§70). But the illumination of a dark space does not necessitate the propagation of light, only the positioning of a fire at the right distance and angle for its rays to fill a space. And the weakening effect of a light-ray away from the source could be due to other reasons, like the dispersion of light-rays in space, the intensity of the fiery source, the quality of fuel, or even the resistance from the intervening space. The language does not help.<sup>50</sup>

There is however another hint that may be useful, depending on how much one wants to draw lines of contact between the theory of light and the theory of colour. In a small passage explaining why the earth was originally invisible according to *Gen.* 1:2a, Nyssen gives us a brief definition of colour: it is 'like some sort of effluence of the surface shape' (*hoion tis aporroē tou kata tēn epiphaneian schēmatis*).<sup>51</sup> The language of *aporroē* is distinctively Empedoclean and famously reprised by Plato.<sup>52</sup> The definition of colour in relation to surface has reportedly Pythagorean echoes.<sup>53</sup> If that is the contextual framework of Nyssen's theory

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<sup>49</sup> The question was raised by Christopher Stead (1994). The two alternatives that Stead had in mind were an 'outflowing' model of light as effluence of flame (for which see below) and a 'static' model of light as the extension of its source, 'as some Stoics had held' (p. 727). As regards the 'static' model, I am not entirely sure which text Stead had in mind. The closest textual evidence I could find is Marcus Aurelius' *Meditations* VIII.57, a text that has gone unnoticed in secondary bibliography. We there find two mutually exclusive models of the ray-theory, a model of pouring forth (*chusis*) or diffusion (*diachusis*) and a model of outpouring or effusion (*ekchusis*). The former model identifies the pouring forth (*chusis*) of fire with extension (*tasis*) and extension with the light-ray (*aktis*), providing a very telling paronymy of ray (*a-ktis*, *ak-tinos*) from extension (*ek-teinō*, *e-ktasis*). This model seems to be what Stead had in mind when he spoke of light as a static extension of fire, especially since the passage tells us that the ray remains still (*estē, istasthai*) and illuminates (*epilampein*) that which receives it (*to dechomenon*). But we need to note here that neither of the two models is 'static.' Both theories of light are conceived as dynamic models of the propagation of light. The *tasis* ('extension') model does indeed employ a static language as regards the illumination of space and of the objects therein. Strictly speaking, however, this is not a static model of *light* but a static theory of *illumination*. In what follows, I distinguish between the propagation of light (prior) and the illumination of space (posterior). The real question is whether the propagation of light is only logically prior to the illumination of space (allowing no interval of time between the two) or also temporally prior (accepting an interval of time, no matter how infinitesimally small).

<sup>50</sup> In other words, Nyssen's language of *eischusis* could fit both alternative models described by Marcus Aurelius in *Meditations* VIII.57. It is impossible to tell based only on linguistic criteria whether Nyssen's *eischusis* refers to the (*dia-*) *chusis* or the *ekchusis* model.

<sup>51</sup> See *In Hex.* 16 GNO 28.1-3.

<sup>52</sup> For Empedocles see Plato *Meno* 76d4-5; Aristotle *De anima* II.7 (418b15); Theophrastus *De sensu* 7.10-1; Aëtius *Placita* IV.14 (in the context of catoptrics); Kirk, Raven and Schofield (1983), 309-10. For Plato's further development of the theory see *Tim.* 67c6-7.

<sup>53</sup> See Aristotle *De Sensu* 3 (439a30-1); Aëtius *Placita* I.15.2. According to Aristotle's report, the Pythagoreans did not seem to distinguish between 'surface' (*epiphaneia*) and 'colour' (*chroia*), see Burkert (1972), 57 n.26, 68 n.96, 236 n.93, 247.



of colours *and* if Nyssen thinks of colour and light in similar terms – a plausible assumption<sup>54</sup> – we may further infer that Nyssen is broadly thinking in terms of some kind of Empedoclean-Timaeian theory of light as effluence of flame.<sup>55</sup> There are two pieces of evidence that support this suggestion. In the middle of a dialectical argument in support of Basil’s physics of light, we are told that the ray conveys thermal power to the surface that it hits making the water evaporate from the earth (§33). The language suggests that the ray is not the mere conveyor of the thermal power of fire but that it affects the surface with its own heat (*tōi thermōi tēs aktinos*). This is possible only if light is a species of fire and therefore shares in fire’s brightness and heat. If that is the theoretical terrain we find ourselves in, then Nyssen’s light is very close to the Timaeian theory of light as the second species of fire.<sup>56</sup> As such, it shares in all of fire’s physical characteristics, agility, swiftness and sharpness included, but in the most refined way possible. If so, it may indeed cover huge distances in space instantaneously.<sup>57</sup>

For the second piece of evidence that light is an outflowing current and not a static extension of flame we have to look at Basil’s explanation of celestial illumination. In his exegesis of day four, Basil gives the example of a lantern (*luchnos*) to illustrate how the heavenly bodies work as physical systems of fire burning and emitting light and heat.

In fact, at that time [sc. day one] the very nature of light (*tou phōtos hē phusis*) was introduced, but now this solar body (*to hēliakon touto sōma*) has been made ready to be a vehicle (*ochēma*) for that primordial light (*tōi prōtotonōi phōti*). Just as fire (*pur*) is different from a lantern (*luchnos*), the one having the power to give light (*tēn tou phōtizein dunamin echon*), and the other made to show the way (*paraphainein*) to those who need it, so also in this case the luminaries (*phōstēres*) have been prepared as a vehicle (*ochēma*) for that pure, clear, and immaterial light (*tōi katharōtatōi ekeinōi kai eilikrinei kai aülōi phōti*). (*Hex.* VI.2 GCS 91.1-6 tr. Way, amended)

The example is meant to illustrate the difference between fire as such, whose natural capacity is to illuminate things, and a particular fire which in order to shed its rays, needs to burn fuel, like the flame burning in a lantern. Seemingly innocuous, the example is but the celebrated analogy used by Empedocles in an ophthalmological context to argue that the mechanism of the eye is like that of a lantern.<sup>58</sup> Empedocles’ explanation of the physiology of the eye

<sup>54</sup> See e.g. *Tim.* 45b-e, 58c and 67c-68d: light and colours belong to the same species of fire as effluences of flame commensurate with the visual ray; Ptolemy *Optica* II.23: light and colours belong to the same genus.

<sup>55</sup> It should be noted that in the tradition Empedocles was considered a Pythagorean and the *Timaeus* was interpreted as a Pythagorean document, see Burkert (1972), 53-66, 84-5 (on the *Timaeus*) and 111, 289-90, 292-3, 454 (on Empedocles). It should also be noted that in his critique of the ray theory, Aristotle treats the Empedoclean and the Timaeian theory of vision as one theory, see *De anima* II.7 (418b14-6; 20-6) and *De sensu* 2 (437b10-4; 438a25-7). It is no surprise then that Nyssen feels justified in assuming a common theoretical framework, from which he draws. That Nyssen works with Aristotle’s classification in mind is clear from his introductory phrase on the theory of colour which is a verbatim quotation from the *De anima* II.7 (418a.29), identifying colour as the special sensible of vision (*to gar horaton chrōma esti*). He immediately changes, however, to the Empedoclean-Timaeian theory of *aporroē* in conjunction with the Pythagorean theory of colour-surface.

<sup>56</sup> See *Tim.* 58c5-d1 and my discussion below.

<sup>57</sup> As suggested, *a contrario*, by Aristotle’s critique of the Empedoclean and Timaeian ray theory, see *De anima* II.7 (418a20-6); cf. also *De sensu* 3 (446a20-b2).

<sup>58</sup> Fr. 88 Wright = B 84 DK. See Sedley (1992). Here is the fragment in Sedley’s translation:

From these divine Aphrodite made the unfailing eyes...

And just as when someone planning a journey through the stormy night prepares a lamp (*luchnon*), a flame of blazing fire (*puros selas aithomenoio*), fitting to it lantern-sides as shields against the various winds (*anemōn lamptēras amorgous*), and these scatter the blowing winds’ breath, but the finer part

includes two different kinds of fire, the ‘flame of blazing fire’ (*puros selas aithomenoio*) that burns inside the lantern, and ‘the finer part of the light’ which ‘leaps out and shines across the threshold with its unyielding beams’ (*phōs d’ exō diathrōskon, hoson tanaōteron ēen*). It logically presupposes, though does not mention, the oil that the flame burns in order to sustain itself, and the residue that is left by the burning process.<sup>59</sup> Plato, in the *Timaeus*, will distinguish between the various components of the mechanism of light as three different kinds of fire: the first species is the flame that consumes the fuel; the second species is the beam that springs out of the flame as its effluence and brings light to the eyes; and the third species is what is left from the burning process, the residue of fire (58c5-d1).<sup>60</sup> Basil reprises the analogy of the lantern, distinguishes between two aspects, an internal and an external, and uses it to explain the mechanism of celestial fire.<sup>61</sup> In *Hex.* III.7 he introduces the lantern simile in a meteorological context to illustrate the *internal* mechanism of celestial fire, namely how the flame of the planets and the stars (most notably the sun) fuels itself continuously through the consumption of moisture exhalations from the sublunary. In *Hex.* VI.2 he reiterates the simile, this time in an astronomical context, to illustrate the *external* mechanism of celestial fire, namely how the celestial flames of the planets and the stars propagate rays of light to earth. Nyssen, following Basil, reprises the lantern simile in a meteorological context to illustrate at length the precise interaction of celestial fire with terrestrial water through the mediation of the hydrological cycle.<sup>62</sup> Later, he bases his entire exegesis of the creation of the heavenly bodies on Basil’s distinction between fire as such (day one) and the particular celestial fire of the planets and the stars (day four).<sup>63</sup> Though he does not mention the lantern simile in this astronomical context, he clearly elaborates on the same physics of fire as Basil, as the identification of the heavenly bodies with celestial flames shows. If so, Nyssen too conceives of the light-ray in terms of the Timaeian second species of fire, i.e. as an effluence (*aporroē*) of flame. Light travels. And it does so instantaneously.

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of the light leaps out (*phōs d’ exō diathrōskon, hoson tanaōteron ēen*) and shines across the threshold with its unyielding beams (*lampesken kata bēlon ateiresin aktinessin*); so at that time did she bring to birth the round-faced eye, primeval fire (*ōgugion pur*) wrapped in membranes and in delicate garments. These held back the sea of water that flowed around, but the finer part of the fire penetrated to the outside (*pur d’ exō diieskon hoson tanaōteron ēen*).

<sup>59</sup> See e.g. Philo *Aet.* 91.

<sup>60</sup> On the Timaeian reception and modification of Empedocles’ simile see O’Brien (1970).

<sup>61</sup> For the lantern (*luchnos*) as archetypical model for the ancient physics of light see Theophrastus *Ign.*, e.g. § 12, 22, 23, 25, 27, 28, 50); Plinius *Nat. Hist.* II.8.6; Plutarch *De Primo Frig.* X (949A); Achilles *Eisag. (De Universo)* IV.4 Di Maria 11.24-5. In a hexaemeral context see Severian *In cosmogoniam* I.5 PG 56:435. The imagery of the heavenly bodies as lamps Basil can derive directly from biblical exegesis/symbolism through a Philonian lineage, see *Heres* 218-22. In the hexaemeral tradition there is a parallel use of the lantern simile as archetypical model for the symbolism of light, see Aristobulus fr.5 (Eusebius P.E. XIII.12.9-16) and fr.5a (Clement Strom. VI.16 GCS 137.4-138.4): wisdom as lamp (*lamptēr*); cf. Philo *Mig.* 40 and *Spec.* I.288: wisdom as light, further *Opif.* 31: the *logos* as light; Theophilus, *Aut.* II.13: the *logos* as lamp (*luchnos*); Severian *In cosmogoniam* IV. PG 56: the *logos* qua *Torah* as lamp (*luchnos*) and light. See on the beginnings of this tradition Carl Holladay, *Fragments from Hellenistic Jewish Authors*, vol. 3 (Atlanta, GA: Scholars Press, 1995), 224-6; Walter (1964), 65-81.

<sup>62</sup> See *In Hex.* 39-40 GNO 51.8-52.19, *pars pro toto* argument (*hoper en tōi merei touto kai peri tou pantos*): what holds true for the physics of fire at the microscopic level of a lantern (*luchnos*) holds true universally, i.e. also for the physics of fire at a cosmic level.

<sup>63</sup> See §§65-73. The pure fire of day one is the process of *diakrisis* of fire from the other elements. The heavenly bodies form individual physical systems of fuel, fire and light through the process of *sundromē* of fire particles, for which the interaction with the other elements is required.

#### 4. The speed of light

We can stretch further the combined reading of Basil and Nyssen's ray theory. The *Homilies* and the *Apology* both admit that the light-ray conveys thermal power. The identification of the light-ray with the second species of Timaeian fire explains the reason why. If light is a species of fire it must generate heat. The *Timaeus* insists, however, that light does not burn. Basil has an explanation for that: the heat of the ray diminishes as it travels because of the cooling down effect of the air that it traverses. That allows the light-ray to convey thermal power at long distances, like that between the sun and the earth, yet without any (direct) caustic effects.<sup>64</sup>

The combined reading of Basil and Nyssen offers further helpful insights into the nature of the light-ray. Nyssen suggests that the light expands uniformly and symmetrically in space. At the end of the already quoted passage on the conic shadow of the earth we are told that if one were to pass from the shadow to light

one would certainly find oneself in light unbroken (*mē diakoptomenōi*) by darkness. (*Opif. hom. XXI.3*)

For light to be 'unbroken by darkness' it is necessary that there are no gaps *in* the light-rays nor *between* the light-rays. For the light-ray to have no foreign particles in it, it needs to emanate as a continuous stream. For two adjacent rays to have no foreign particles between them, they need to emanate in continuous and uniform bundles. If so, light propagates uniformly and symmetrically in space. If we now turn to Basil we get the justification for light's symmetrical flow: it is because light is a simple and homoimerous substance.<sup>65</sup> Being simple and homoimerous, light expands symmetrically in all directions.<sup>66</sup> But not *ad infinitum*. The further crucial piece of information we get from the combined reading of Basil and Nyssen is that light travels not in a vacuum but in a medium (air or water) with variable density, which affects the ability of light to travel. In his explanation of the first illumination Basil writes:

The air was illumined (*perielampeto de aēr*), or rather, it held the whole light completely permeating it (*edkekramenon heautōi holon diolou eiche to phōs*), sending out dazzling rays in every direction (*pantachou*) to its uttermost bounds. It reached upward even to the aether itself and the heavens (*aithera kai ouranon*), and in extent it illuminated (*katephōtize*) in a swift moment of time (*en oxeiai kairou rhopēi*) all parts of the world (*panta ta merē tou kosmou*), north and south and east and west.

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<sup>64</sup> The air has a cooling-down effect depending on its exposure to fire and the presence of moisture in it, see *Hex.* III.7, III.8, IV.5, VI.10. Nyssen expresses the same idea in 55 GNO 65.20-66.2 (see also §§29 and 41). In the context of the Aristotelian theory of the elements that Basil and Nyssen follow, air is primarily humid and becomes cold with the departure of (the sun's) heat, which results in the condensation of moisture into water, see *Meteor.* I.9-12 (347a-349a), II.9 (369a-b). Thus, in Aristotle's biological writings, air has a natural cooling-down effect next to water, see *Part. anim.* III.6 (669a). The same idea can be also maintained *mutatis mutandis* in the context of Stoic physics, according to which air is primarily cold, see Philo *Deus* 79 (already discussed in the previous chapter).

<sup>65</sup> See *Hex.* II.7 GCS 33.10-3.

<sup>66</sup> Unless of course light is obstructed by an opaque surface. Thus, the visual current projects conically because the anatomy of the eye leaves only a spherical cap of the eyeball without membranes, namely the cornea. The heavenly bodies as long as they are theorized as celestial flames are not confined by opaque borders and are able to radiate the light uniformly in every direction, see *Hex.* VI.9 GCS 104.16-7: 'the brightness poured forth from them [sc. the sun and the moon] suffices to light up the heavens and the air, and at the same time to extend to the earth and the sea' (tr. Way).

For, such is the nature of aether, so rare (*leptē*) and transparent (*diaphanēs*), that the light passing through it needs no interval of time (*hōste mēdemias parataseōs chronikēs prosdeisthai to phōs di' autou poreuomenon*). As it passes our glances (*opseis*) along instantaneously (*achronōs*) to the objects at which we are looking, so also it receives the rays of light (*tas tou photos prosbolas*) on all its boundaries in a moment of time (*akariaiōs*), so that one could not conceive a shorter space of time (*elattōna chronou rhopē*). (*Hex. II.7 GCS 32.5-15 tr. Way*)

Basil tells us that the ray travels instantaneously (*akariaiōs*) in aether because of its rare and transparent nature (*phusis leptē kai diaphanēs*). 'Instantaneously' here means an infinitesimal length of time (*en oxēiai kairou rhopē*), conceivable only in thought (*mēdemias parataseōs chronikēs*). This is possible only if light travels at infinite speed.<sup>67</sup>

## 5. Introducing field theory

Given that the ray travels at infinite speed, one would expect it to traverse any region of space until it reaches the extreme limits of the universe. This is not always the case. Basil gives us clear indications that the range of the ray varies according to the medium, i.e. the 'stuff' that fills the intermediary space that the ray travels through. Aether, we just saw, allows the light to permeate it completely because of its fine and porous structure. Yet, we are told later, the denser parts of lower air generate more resistance, preventing a weak beam of light from traveling far.<sup>68</sup> Finally, water, which is even denser than air, prevents the light from fully penetrating the deep.<sup>69</sup> The examples suggest a field variable. Everything else being equal, the light should travel until it hits upon an opaque surface. But everything else is not equal. The resistance of the intervening space varies according to the density and purity of the medium (aether, air, water and their admixtures). Thus, the resistance of the medium determines the ray length, i.e. the distance a ray is able to travel.

There is another variable that co-determines the ray length: the size of the fire that generates it. Basil cites two examples: The light of sun is able to illuminate the whole sky and the atmosphere, while the light of the stars can barely reach the surface of the earth, weakened by the distance, in spite of the fact that the stars are so numerous, sending uncountable rays

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<sup>67</sup> The infinity of light's speed seems to be a substantial part of Aristotle's famous critique of the emanation theory of light in the *De anima* II.7 (418b20-6), cf. also the *De sensu* 3 (440a20-31). Aristotle had extensively argued against the coherence of the notion of actual infinity in *Physics* III. He could then extend the refutation to include the Empedoclean-Timaeian theory of light and colours as *aporroē*, denying the possibility of an instantaneous travel of the light-ray, see *De anima* 418b21-3: *hōs pheromenou tou photos kai teinomenou pote metaxu tēs gēs kai tou periechontos, hēmas de lanthanontos; De sensu* 440b22: *chronon anaisthēton*. Later Peripatetic commentators also reacted strongly against the possibility of light having a corporeal nature and travelling at infinite speed, see Samuel Sambursky, *The Physical World of Late Antiquity* (Princeton, NJ: Princeton University Press, 1962, repr. 1987), 113. It is precisely the theory that Basil clearly follows: light travels instantaneously (*akariaiōs*), i.e. with infinite speed. Nyssen implies exactly the same when he says that light travels with the speed of thought (*isa noēmati* 14 GNO 25.4). Ambrose, *Exam.* I.9.33, combines both insights into one formula: *momento temporis sine nulla comprehensione*.

<sup>68</sup> See *Hex.* VI.9 GCS 105.7-12 as regards the visual ray. But the visual ray is akin to the light-ray, only weaker, see *Tim.* 45b4-d5.

<sup>69</sup> See *Hex.* II.4 GCS 27.13-21. Basil qualifies twice the ability to see through water (*pollakis*, i.e. not always) which I take to imply penetration limits according to density and/or depth.

to earth.<sup>70</sup> Conversely, the light of the stars is able to reach the surface of the earth even though it does not have the power to illuminate the atmosphere. Yet, the visual ray, i.e. the internal light of the eyes, is even weaker, unable to penetrate the air without the support of external light.<sup>71</sup> There is a clear difference in the intensity of light which directly affects the distance a ray is able to travel. Basil's explanation is that the difference is contingent upon the concentration of fire in the light-source: the bigger the fire, the greater the intensity of the light emitted. But we already know that the ray is homoiomerous, which means that there can be no qualitative difference between one ray and another. And since the difference in intensity is quantifiable, the implication is that bigger fires emit more rays or thicker bundles. It turns out that the ray length is a function of the compactness of the bundle and the compactness of the medium. This explains why Nyssen, in the *Apology*, can maintain that light travels instantaneously (*euthus*) in outer space (§10), and yet only a weak portion of the light of the stars reaches the earth (§70). Evidently, the ray behaves like a corpuscular entity of a special status.<sup>72</sup> Being quasi-immaterial, light travels with infinite speed. And yet its impact factor is influenced by the medium. We must then concede that light's kinematic behaviour is contingent upon the physical properties of the field.<sup>73</sup>

### III. The *metaxu* of light: A metaphysical note on the medium

#### 1. A medium of light?

I have been talking about the effect of the medium on the light-ray. A note is appropriate here as regards the effect of the light-ray on the medium. The ray theory does not, strictly

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<sup>70</sup> See *Hex.* VI.9 GCS 104.14-21 and VI.10 GCS 106.9-21.

<sup>71</sup> See *Hex.* VI.9 GCS 104.14-7 and 105.7-10.

<sup>72</sup> The recourse to general dynamics goes a certain way towards explaining the ray length. I have here tried to argue by analogy to classical optics which accounts for the diminished power of the visual-rays either due to their dispersal as they pass farther from the centre of radiation (so e.g. Euclid *Optica* props 2 and 3) or due to the weakening effect of distance (so e.g. Ptolemy *Optica* II.20, III.22), see Smith (1996), 78 n.29, 140 n.26. General dynamics, however, cannot explain the speed of light, which is a singular phenomenon in the physical universe of late antique sources.

<sup>73</sup> It is striking that while the medium clearly influences light-kinematics, I can find no indication in the Cappadocians, or in all ancient physics for that matter, that the speed of light varies. On the contrary, Heron, *De speculis* II.1 and 2 Nix/Schmidt 320.10-322.8, explicitly argues that the speed of light is constant (*continua velocitate*) and infinite (*infinita*), covering infinite distances instantaneously. See also the 13<sup>th</sup> hypothesis of Damianus' *Optica* 16.11-12 Schöne (*hē tou hēliakou phōtos epektasis achronōs ginesthai doxeien*). As I have shown, the Cappadocians too subscribe to the view that light travels instantaneously and at infinite speed. The only variables, then, are the intensity of light and the resistance of the field. The influence of the properties of the medium on the distance that light travels might sound like an indication of wave-like properties. If so, a denser medium ought to slow the light down. If, however, light travels at constant (since infinite) speed, it is not possible to uphold a wave theory. To be sure, I am not suggesting that ancient physics anticipated general relativity. I am only suggesting that approaching the ancient ray theory from a post-Einsteinian perspective helps us search for the principles that explain it rather than to dismiss it as paradoxical. Indeed, if we were to approach ancient ray theories from the point of view of classical physics, it would be impossible to explain how light covers different distances in different mediums while everything else (i.e. velocity, time and acceleration due to infinite speed) remain equal. In a sense of a loose analogy, then, the hexaemeral light-ray is influenced by the medium very much like general relativity light is influenced by a gravitational field.

speaking, require a ‘medium’ as an intrinsic part of the mechanism of light. Light, as such, is the natural power of fire, an effluence that springs forth as a continuous stream from its fiery source. As already noted, however, the light-ray does not travel in a vacuum. In ancient physics there is no conceptual space for an intra-cosmic void unless one is an atomist.<sup>74</sup> The Cappadocians expressly reject atomism, because of its materialistic metaphysical connotations, and with it the notion of ‘empty space.’<sup>75</sup> Since there is no empty space in the hexaemeral physics, there is always a *metaxu* of light, i.e. a mass or ‘stuff’ (aether/air, water and their admixtures, i.e. ‘exhalations,’ clouds, smoke etc.) that fills the space *between* a fiery source and the surface of things. And since the light-ray is of a corporeal nature, as I have argued, there is a necessary physical interaction between the stuff that fills space and the ray that travels through. This does not make air a medium of light more than it makes air a medium of a flying stone, arrow or spear. In all cases of projectile motion there is some kind of mass occupying the intermediary space, something (air, aether etc.) that the ray, the stone, the arrow or any flying object needs to *pass through* in order to reach its target. Only in the latter sense can one speak of a (local, i.e. external) medium of light in Cappadocian physics.<sup>76</sup>

## 2. Transparency and brightness

The question is what happens to the medium when it receives a bundle of rays. To put it differently, what is it that allows a bundle of rays to travel through the medium but not

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<sup>74</sup> See Long and Sedley (1987), §6 with comments *ad loc.*

<sup>75</sup> See Basil *Hex.* I.1 GCS 1.9-10 and I.2 GCS 4.7-17; Nyssen *In Hex.* 9 GNO 19.5-6 and 17 GNO 29.12-7, with the explicit rejection of the void.

<sup>76</sup> This is clear for Nyssen who only speaks of air as a medium of vision, not of light, see *In Hex.* 25 GNO 39.2-3: *blepomen gar di’ autou*. The case *seems* to be different with Basil who speaks of the ability of the transparent air/aether to receive (*dechomenē, upodechetai*) the ray and to send it along (*parapempousa, parapempōn, parapempei*), in a way analogous to the visual ray, see *Hex.* II.3 GCS 26.5-7 and II.7 GCS 32.5-15. A careful reading of the Basilian passages shows that there is no functional medium of light in Cappadocian physics, only intermediate space filled with stuff. Basil uses a similar technical vocabulary as regards Aristotle’s other known medium, namely water. For Basil, waters not only receive the light letting the ray pass through (*dechomena tēn augēn*), but they also send some of it away (*alla kai antipemponta*) causing the phenomenon of reflection (*kata tēn anaklasin*). Thus *para-pempō* and *anti-pempō* denote two different modes of interaction of light with transparent substances (air and aether = *diaphanēs*, see *Hex.* II.3 and II.7) and translucent substances (water and crystals = *diaugēs*, see *Hex.* II.4 and III.4) respectively. While a transparent substance allows all of the light-rays to pass through, a translucent substance does so only partially, reflecting the rest of the light-rays. This shows that Basil does not follow the Peripatetic theory of the transparent. In this context, the proper range of meanings of *parapempō* is between ‘reflect’ and ‘allow to pass through.’ Any rendering as ‘pass on,’ ‘send along’ or ‘transmit’ etc. should be understood in terms of being permeated by light rather than as an active transmission, not even in the sense of *antiperistasis*, i.e. of the interchange of places between the air’s particles and the light-particles, as some thinkers had suggested, cf. Alexander Aphrodisias *In DA* 29.15-27; *Mantissa* 128.31-129.7; Plotinus *Enn.* IV.5.2.34-48. The Cappadocians seem to endorse a version of *antiperistasis* in general, see Risch, *Sechstageswerk*, 194-5 n.236, 195-6 n.238. But they do not apply it to light, nor could they in my view, since, contrary to rocks and missiles, the light-ray is continuous and leaves no space behind it for the air to fill in. The only possible physical interaction between the ray and the air then must be the continuous infiltration of air by the ray as it passes through. The ray theory excludes Aristotle’s theory of the transparent. The absence of a tonic or pneumatic theory rules also out the Stoic theory of the medium. The exclusion of *antiperistasis*, together with the instantaneous propagation of light, prepares the ground for a significant later development in ancient physics by an author who follows closely in the footsteps of Cappadocian exegesis, namely John Philoponus’ impetus theory of light, for which see Sambursky (1962), 74-6, 113-7; De Groot (2016).

through an opaque, solid object? The answer is simple: it is the medium's transparency. Basil speaks of transparency (*diaphaneia*) on three occasions, approaching it from two angles: as regards vision, transparency is what allows the medium (air) to 'admit all the forms of visible objects and transmit them to the eyes of the spectators' (II.3). As regards the nature of the medium (aether) itself, transparency is what allows 'the light to pass through' (II.7). In both cases Basil mentions transparency together with the rare (*araia*) or fine (*leptē*) nature of the medium, suggesting that dense materials do not have enough transparency to allow light to pass through.<sup>77</sup> If we now turn to Nyssen, we find a more detailed analysis of the transparent nature of the medium.

Air is able to receive all things because of its supple and pliant nature, showing all things in itself, since it possesses no colour of its own, no shape (*schēma*), no surface, but takes its outline through foreign colours and shapes. It becomes bright (*lampros*) when light shines (*tēi tou photos ellampsei*) and it falls back into dark (*kai palin melainetai*) when shadowed. Air by itself is neither bright (*lampros*) nor dark (*melas*). It is surrounded by every shape and filled by every kind of colour. It accommodates every type of movement. (*In Hex. 25 GNO 38.6-17 tr. McCambley, amended*)

The passage does not mention 'transparency' but it clearly describes it: it is the property of the medium (air) 'to receive all things because of its supple and pliant nature, showing all things in itself.' But this property cannot be actualized without light, in the absence of which the air becomes dark. On the contrary, when light enters the medium, its transparency is activated and it becomes bright. Transparency, then, is the brightness of the medium, a quality not intrinsic to it, since 'air by itself is neither bright nor dark,' but extrinsic. And since the medium has no colour of its own but becomes bright when the light shines in it, brightness functions as a colour: it is the epiphenomenal colour of the medium *qua* transparent.<sup>78</sup> If we now ask, why is it that the medium becomes bright in the presence of light, Basil gives us a further lead. He suggests that brightness is the intrinsic property of light, light's own proper colour. Just as whiteness is an accidental quality whose bearer is predicated as 'white,' so too is brightness an accidental quality, whose bearer is called 'bright.'

Do not let what has been said seem to anyone to be beyond belief, namely, that the brightness of the light (*tou photos hē lamprotēs*) is one thing and the body that is the substrate of the light (*to hupokeimenon tōi phōti sōma*) another. First, because we divide all compounds (*ta suntheta panta*) into the bearing substance (*tēn dektikēn ousian*) and its accompanying quality (*tēn episumbasan autēi poiōtēta*). Just as, therefore, whiteness (*hē leukotēs*) by nature is one thing, but a whitened body (*to leukasmenon sōma*) something else, so also the things just mentioned, although different (*diaphora*) by nature, are brought together (*hēnōtai*) by the power of the Creator. (*Hex. VI.3 GCS 91.12-92.1 tr. Way amended*)

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<sup>77</sup> Between transparent (*diaphanēs*) and opaque objects there is the intermediate category of translucent objects (*diaugēs*), like liquids (esp. water) and crystals, see *Hex. II.4* and *III.4*. Translucency is, apparently, transparency of a diminished degree.

<sup>78</sup> On the transparency of the medium see Kalderon (2018); Ierodiakonou (2018). The Cappadocians clearly expound a modified version of Aristotle's theory of light and colours. While Aristotle in the *De anima* II.7 calls 'light' the actualisation of the transparent *qua* transparent in the presence of a fiery body, the Cappadocians retain the same causal scheme but replace 'fire' with the 'light-ray' as a species of fire. Moreover, generalising the suggestion of the *De sensu* 439b1-2, they identify 'transparency' with 'brightness' as the explanans of colour. This allows them to combine the ray-theory with transparency. Following the logic of the *De Sensu* 3, in the modified reading of the *De anima* II.7, fire makes other things visible by actualising their brightness through its rays. The actualisation of brightness through the presence of light-rays in indeterminate bodies like air renders the medium transparent.

I have already discussed the context of this passage when I referred to Basil's dependence on Origenian-apocryphal material. The issue at hand is the difference between the light of the first day and the light of the stars on the fourth day. The gist of the argument is that the heavenly bodies, being the bearers of the purest form of light, are pre-eminently bright. Celestial fire, by inference, is the paradigmatic example of a bright substance in the hexaemeral physical world.<sup>79</sup> If we now combine this passage on the brightness of celestial fire with the previous one on the brightness of the medium, we realize that brightness has a double function: On the one hand, every fiery body, being inherently luminous, *is* bright by nature. On the other hand, the medium, having no colour of its own, *becomes* bright, in the presence of light. Light is the connecting agent between fire and the medium. 'Light' as the intrinsic quality of fire (in the sense that every fire is inherently luminous) is the brightness of fire, i.e. its colour. 'Light' as the natural power of fire (in the sense that every fire emits light) is what transmits the brightness of fire to the medium and makes it transparent.<sup>80</sup>

### 3. Light semantics as key to light hermeneutics

If my analysis is correct, light is revealed to be a *pollachōs legomenon*. In one sense, it denotes fire as a bright, i.e. *luminous*, substance (*phōs = pur – phaos*). In another sense, it denotes the *productive power* of fire, i.e. the ray that causes the medium to become bright (*phōs = augē – aktis*). In a third sense, it denotes *lightening*, i.e. the illuminating *activity* of fire on an external patient by the mere presence of the ray in it (*phōs = phausis*). In a fourth sense, it denotes the *state of illumination*, i.e. the capacity of an external patient to receive the ray and be acted upon (*phōs = phōtismos – ellampsis*).<sup>81</sup> The combined action of the first three, active, senses of light (i.e. the luminous substance, power and activity) results in the manifestation of the fourth (i.e. illumination). It is in the latter, passive, sense that light appears as a perceptual phenomenon in the world, i.e. as *phantasia*. This is a further, stretched, sense of 'light' indicating that phenomenality (*phainesthai*) is the derivative outcome of the concurrence of the three active senses of 'light' (*phōs* as *pur, augē/aktis*,

<sup>79</sup> This fits well with the Timaeon account of colours, if we regard brightness (*lampron*) or brilliance (*stilbon*) in *Tim.* 67e6-68a8 as the colour of extremely concentrated fire, like that of the heavenly bodies, most notably the sun, cf. 40a2-4. For the difficulties in interpretation see Ierodiakonou (2005), 226-7.

<sup>80</sup> By making 'brightness' the overarching concept in the theory of light, and by a series of interpretative modifications, the Cappadocians suggest that it is possible to bring Plato's and Aristotle's theory of light 'in agreement.' My interpretation is in conformity with the thesis of Karamanolis (2006), with one caveat: While Platonists turned to Aristotle to discover and elucidate Plato's doctrines (Karamanolis), the scriptural exegetes turned to Plato to elucidate Moses' philosophy and to Aristotle to elucidate Plato.

<sup>81</sup> The polysemy of light seems to be the major reason behind the different ancient approaches to light. The distinction between 'light' and 'illumination' has a prehistory, see Alex. Aphr. *In DA* 43.8-46.19; Ptolemy *Optica* II.23. But it is in the hands of the hexaemeral authors that it acquires a normative content, acquiring its shape through Origen (*Hom.* III.3 *in Ps.* 73) and Basil (*Hex.* VI.2), passing into the Latin West through Ambrose's *Exam.* (see e.g. IV.3.9: *simplex enim lucis est species, ut lumen praebet*), and consolidating in the scholastic tradition as the celebrated '*lux – lumen*' distinction of Isidore of Seville, *Etymologies*, VII.2.24 and XIII.10.14 [=Barney, Lewis, Beach and Berghof (2006), 156, 274]; Robert Grosseteste, *Hexaëmeron*, II.10.1-2 [=Martin (1996), 97-99], summarizing the doctrine of the *De Luce* ('lux' denoting the corporeal theory of light, attributed to Augustine and alluding to the Platonic theory of *aporroē*; 'lumen' signifying light as the relational quality of fire, attributed to John Damascene and alluding to the Peripatetic theory of the transparent as illumination of the medium).



*phausis*) and the converse side of the fourth passive sense (*phōs* as *phōtismos/ellampsis*).<sup>82</sup> While the triptych of the luminous substance-power-activity denotes the one unified event of the propagation of light, illumination, and hence perceptibility or phenomenality, denotes a second event and the outcome of the first. This polysemy of the language of light can lead to misunderstandings if the different senses and their corresponding stages are not clearly defined by conceptual analysis. Thus, 'light' might appear as both cause and effect, but it will not be the same event that 'light' denotes as cause and as effect. Similarly, one may speak of 'light' as cause of 'illumination,' and yet one will still need to clarify that the one event of the propagation of light involves three conceptual stages, namely a luminous essence (a fiery substance), its power (the light-ray), and its activity (actualisation of the transparent), that are one inseparable unity in the physical world but are distinguishable in thought. What the various senses of 'light' have in common is that they express different meanings of 'brightness': brightness as the luminous essence of fire; brightness as what emanates from fire through the ray; brightness as what is transmitted through the ray to the medium; and brightness as the epiphenomenal colour of the medium.

If the above attribution of senses to references is correct, it reveals a comprehensive linguistic and conceptual framework of light, aiming to capture the luminous phenomenon from a holistic perspective. Neither the framework nor the language is new: the causal connection between luminosity and phenomenality is already laid out in the *Timaeus* (31b5), together with a rich and variegated vocabulary of light and colours, including the different modes of manifestation of brightness (45b2-46c6, 58c5-d5 and 67c4-68d7). But the comprehensive view is novel, or at least it is the product of a long process of mutual interactions and discussions between the schools that lead to the synthesis of elements that are still disconnected in the Platonic or the Aristotelian corpus. The Cappadocians bear witness to this grand synthesis which appears to give rise to a table of correspondences between the language of light, the physics of light and the metaphysics underlying the causal chain of events that explains the manifestation of light in the world.

semantics	<i>phōs</i>	<i>phōs</i>	<i>phausis</i>	<i>phōtismos</i>
physics	fire	ray	lightening	illumination
metaphysics	substance	power	activity	product
analytics	cause	conductor	transmission	effect

The table depicts the successive stages of transmission of a quality from a substance to its environment. The quality is brightness. The conductor is the light-ray. The process of transmission of brightness is through the actualisation of the transparent by the mere presence of the ray in the medium. The outcome is illumination, or the visibility of space and everything it contains. The three causal factors, namely the luminous substance, its power of illumination and its illuminating activity, co-exist and work together as one agency producing a certain outcome in the physical world. There is no fire without the ray, no ray without a lightening effect, and no lightening effect without any illumination of space. The phenomenal unity of the triptych fire-ray-brightness is the subject matter of the physics of light. The conceptual separation of substance-power-activity is the subject matter of the metaphysics

<sup>82</sup> For the widespread ancient etymology of phenomenal reality (*phainomenon*) and its perception (*phantasia*) from light (*phōs/phaos*), see above (1.IV.3).

of light. Ultimately, however, physics and metaphysics are just two aspects of the same causal chain of analysis of the light of creation.<sup>83</sup>

#### IV. The metaphysics of light: A hermeneutical coda

##### 1. A dual aspect interpretation

The two parallel axes of the Cappadocian analytics of light, the physical and the metaphysical, take us back to the bigger hermeneutical issues at hand when dealing with the hexaemeral narrative. The double analysis requires a double textual support, if it is to be a *hexaemeral* analytics of light at all and not the whimsical display of Cappadocian erudition, as ancient and modern critics complain. Basil provides the textual basis needed by distinguishing between the light of the first and the light of the fourth day of creation. Day one entails the metaphysics of light: an approach to light from an abstract-theoretical perspective, *light as such*. Day four on the other hand elaborates on the physics of light: light as part of a physical system, like the particular light of the heavenly bodies or the lantern. Basil develops gradually this dual hermeneutics of light in two passages. The first passage introduces the double approach (day one–day four):

Now, henceforth, after the creation of the sun [sc. day four], it is day when the air is illuminated by the sun shining on the hemisphere above the earth, and night is the darkness of the earth when the sun is hidden. Yet, it was not at that time [sc. day one] according to solar motion, but it was when that first created light was diffused and again drawn in according to the measure ordained by God, that day came and night succeeded. (*Hex.* II.8 GCS 34.6-10 tr. Way)

The second passage explains why this double approach is needed. I have already quoted and commented on different parts of this ambiguous passage, preparing the ground for its final discussion. I can now quote it again, this time in full.

See, therefore, whether He does not make sufficiently clear what He wished by the word *phauseōs* [sc. *Gen.* 1:14]; instead of 'illumination' (*phōtismos*) He said 'lightening' (*phausis*). This does not conflict with what has been said about 'light' (*phōs*). In fact, at that time [sc. day one] the very nature of light (*tou phōtos hē phusis*) was introduced, but now this solar body (*to hēliakon touto sōma*) has been made ready to be a vehicle (*ochēma*) for that primordial light (*tōi prōtotonōi phōti*). Just as fire (*pur*) is different from a lantern (*luchnos*), the one having the power to generate light (*tēn tou phōtizein dunamin echon*), and the other made to light the way ahead (*paraphainein*) for those who need it, so also in this case the luminaries (*phōstēres*) have been prepared as a vehicle (*ochēma*) for that pure, clear, and immaterial light (*tōi katharōtatōi ekeinōi kai eilikrinei kai aülōi phōti*). [...] Do not let what has been said seem to anyone to be beyond belief, namely, that the brightness of the light (*tou photos hē lamprotēs*) is one thing and the body that is the substrate of the light (*to hupokeimenon tōi phōti sōma*) another. First, because we divide all compounds (*ta suntheta panta*) into the bearing substance (*tēn dektikēn ousian*) and its accompanying quality (*tēn episumbasan autēi poiōtēta*). Just as, therefore, whiteness (*hē leukotēs*) by nature is one thing, but a whitened body (*to leleukasmēnon sōma*)

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<sup>83</sup> My analysis fully concurs with Barnes (2001), esp. 303, who suggests the following explanatory scheme for the Cappadocian metaphysics of power causality: nature (*phusis*) – power (*dunamis*) – activity (*energeia*) – product (*ergon*). My analysis broadens up the scope by including the semantic, physical and causal equivalents to Barnes' (purely) metaphysical chain of analysis.

something else, so also the things just mentioned, although different (*diaphora*) by nature, are brought together (*hēnōtai*) by the power of the Creator. (*Hex.* VI.2-3 GCS 90.22-91.18 tr. Way, amended)

The passage touches upon a hermeneutical issue that is notoriously ambiguous, namely the question whether the primordial light should be understood as a physical entity or not. In the context of Nyssen studies, some scholars have opted for a spiritual interpretation (primordial light = intelligible light), while others have argued for a physicalist interpretation (primordial light = physical light).<sup>84</sup> I have already discussed the physicalist interpretation when I explained Nyssen's notion of the 'immateriality' (*aūlon*) of light in the *Apology* (§66). It is now time that I present (my version of) its spiritual interpretation. A careful reading of Basil's passage reveals that behind the two narratives of light lies the fundamental distinction between the physics of light (day four) and the metaphysics that ground it (day one). Day four speaks clearly of the light of the stars as part of a physical chain of causation, instantiated *par excellence* in the heavenly fire of the stars, for which the celebrated lantern simile serves as an explanatory model. Day one, however, approaches light from a metaphysical perspective. The references to 'the nature of light' (*tou phōtos hē phusis*) in the opening part of the passage, together with the distinction between substance (*ousian*) and quality (*poiotēta*) in the closing part, denote that the exegesis of day one is about light as property (*tou photos hē phusis; tou photos hē lamprotēs*), while the exegesis of day four is about light as a hylomorphic compound (*sōma; ochēma; suntheton*). If indeed there is a reading of Genesis 1:3-5 that allows for light as property, as Basil is suggesting, clearly this notion of light cannot be physical but purely immaterial (*aūloi phōti*). Primordial light (*prōtigonōi phōti*) means no longer 'first' in terms of *temporal succession*, but 'first' in terms of *ontological procession*. Primordially signifies, in this interpretation, what light is primarily, principally, i.e. light as such. This is nothing else than a reference to the *species* of light present in creation, the immanent form or the *logos* of light.<sup>85</sup>

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<sup>84</sup> For the spiritualist interpretation see Hübner (1974), 79-81: 'alle einzelne Lichter in ihren Prinzipien'; for the physicalist interpretation see Risch (1999), 155 n.136, 200 n.256, 222 ns 350-1: 'Es wurde also ein anderes als das noetische Licht geschaffen.' Both authors discuss this as part of Nyssen's so-called theory of 'simultaneous creation,' which is, in my view, misleading. The reference to the seminal study of Hans Meyer (1914), 108-119, is also misleading. Hübner cites Meyer to suggest that the light of the first day is the immanent form of light ('Summe aller Lichtelemente,' p. 81), while Risch cites Meyer to argue that the spermatic creation of the world does not take place in the mind of God ('die reale Grundlegung der Welt außerhalb Gottes,' p. 222). Both references are confusing because Meyer regards the elements as material ('materiel,' pp. 113-4), while he is interested in immanence only as regards the spermatic prefiguration of all things by the divine *logos* (pp. 109-11). I try to clarify the situation a bit in the following footnote.

<sup>85</sup> To be absolutely clear, Basil and Nyssen identify the light of the first day with the illuminating power of pure, elemental fire, see Basil *Hex.* II.7 (*photos phusin*), VI.2 (*tou photos hē phusis*); Nyssen *In Hex.* §§10 (*tou puros hē augē*), 14 (*tou puros tēn phusin*), 12 and 65-6 (*phōtistikē dunamis*). Elemental fire, like all the elements, belongs to the material universe, see *Hex.* I.7, II.2; *In Hex.* §14 (*aisthēton de to pur*). 'As such' (*auto hekaston; eph' heautou*), each element exists in a simple and unmixed state, see *Hex.* IV.5; *In Hex.* §31. The material universe, however, is made up entirely from composite substances, see *Hex.* IV.5; *In Hex.* §5, so that 'none of the visible and perceptible objects is absolutely unique and simple and pure' (*Hex.* IV.4). That means that there is no physical instantiation of the four elements in their pure state, i.e. of the four elements as such. That is the reason why Basil clarifies that the four elements in their unmixed state exist only in thought: *hōs prōta stoicheia tōi logismōi theōreitai* (*Hex.* IV.5). In the physical universe, each element exists only in some form of admixture with the other elements, which is the reason of the *communicatio idiomatum* between neighbouring elements, see *Hex.* IV.5; *In Hex.* §55. Basil and Nyssen make quite explicit, however, that from a metaphysical perspective elemental fire should be theorized in a pure and unmixed state, see *Hex.* VI.2; *In Hex.* §§10, 65, though they both clarify that from the perspective of physics there could never have been such an unmixed state in the material universe, see *Hex.* II.7 (*egkekramenon*); *In Hex.* §12 (*ton aera tē flogi kataugazousa*). This compels the intelligent

Nyssen, following Basil's lead, expounds the same spiritualist interpretation (§65) right before the physicalist interpretation (§66) of the immateriality of light. §65 of the *Apology* is a reflection on the different uses of the biblical language of light: *Gen.* 1:3 speaks of *one* light (*hen phōs*) in the singular (*tēi enikēi phōnēi*), to denote light 'in the general sense' (*tōi genikōi logōi*), i.e. 'the whole of light' (*to pan phōs*). *Gen.* 1:14 on the other hand speaks of *many* lights (*phōta*) to denote the phenomenal light (*ta phainomena*) which is characterized by great variety (*diaphoran*). The language of the one and the many, identity and difference, the general and the particular, is a clear indication that Nyssen too subscribes to the double hermeneutics of hexaemeral light: a metaphysical interpretation of the light of day one as the first (hierarchically) immanent form of creation; and a physicalist interpretation of the light of day four as the manifestation of the first immanent form in the material universe.<sup>86</sup>

## 2. Back to Origen

This dual hermeneutics of light is, of course, so subtle and suggestive that it would entirely elude the untrained multitude. Not so with the erudite. A dual approach to light, both metaphysical and physical, would be totally in accord with Basil's blending of exegesis with advanced philosophical material for the sake of the few. It would also be eagerly anticipated and favourably received by Nyssen's learned audience. If one feels that the spiritualist interpretation maybe comes too close to the allegorical tradition, one would not have been deceived. There is strong textual evidence to suggest that the dual aspect interpretation has its roots in Philonic-Origenian exegesis. The first piece of evidence concerns the apparent narrational anomaly of light shining in the world before the material bodies that generate it were introduced – a point raised by Petrus, echoing, as we saw, the voice of Celsus, Galen

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reader to enquire after the ontological status of elemental fire *as such*. Clearly, it cannot be a transcendent form, because it belongs to material creation. But it cannot be a material entity either, since it is never instantiated, as such, in the physical universe. The only possible alternative is that the four elements in their pure, unmixed state are forms immanent in creation. These ontological entities are known under various names, like 'enmattered forms' (*enula eidē*) or 'forms-in-matter' (*eidē epi tēi hulēi*) to stress their mixed ontological status, as *logoi* to stress their role as rational-formative principles, and as 'seminal reasons or causes' (*spermatikoi logoi*) to stress their dynamic manifestation in time. As regards their ontological function, immanent forms inhere in the material substratum that they act upon and configure into a sensible object. They are thus ontologically inseparable from their particular spatio-temporal instantiations, but epistemologically separable from them (as the form of every hylomorphic compound). That means that immanent forms are separable from the matter that underlies them only in thought, a feature that distinguishes them from transcendent forms. Immanent forms as the spermatic *logoi* of things should not be confused with the universal spermatic *logos* of creation permeating the whole nature and guiding creation to its end (*In Hex.* §§9-11, 16), nor with the primordial opposite pairs of qualities that are the conceptual ingredients of the idealist theory of matter (*In Hex.* §§7, 17). Elemental fire as the formative principle of all fires in the universe is the first particular manifestation of the universal *logos* immanent in creation, arranging the conceptual ingredients of materiality (shape, volume, weight, density etc.) in a particular way, according to the spatio-temporal conditions that fire finds itself in. The arrangement according to the surrounding spatio-temporal conditions is the process described by Nyssen as the *diakrisis* and *sundromē* of fire in the universe in the three days that precede the appearance of the heavenly bodies (*In Hex.* §65-7), while the particular arrangement of fire in every case reveals the individual *logos* of every fiery body (*In Hex.* §§69-71).

<sup>86</sup> The transition from the metaphysical to the physical mode of interpretation is signified by the *katarchas* in the opening sentence of 66 GNO 73.23. From now on the analysis becomes temporal.

and, in all likelihood, Julian. In a passage from the *De Principiis* preserved by the Cappadocians in the *Philocalia*, Origen gives several examples of allegorical interpretation of *Genesis*, the first of which aims to answer the aforementioned narrative challenge.

For who possessed of understanding will suppose that the first and the second and the third day, evening and morning, happened without a sun and moon and stars? And that the first day was as it were without a sky? And who is so foolish as to suppose that *God*, after the manner of a human farmer, *planted a paradise in Eden towards the east*, and placed it in a visible perceptible *tree of life*, so that one tasting of the fruit by bodily teeth would obtain life, and again that one could partake of *good and evil* by chewing what was received from the tree there? And if God is said to *walk in the paradise in the afternoon*, and Adam to *hide himself behind the tree*, I do not think that anyone doubts that these figuratively indicate, through apparent narratives and through things that did not happen bodily, certain mysteries. (*DP* IV.3.1 tr. Behr, italics in original)

Origen's solution to the hermeneutical challenge is *prima facie* unsatisfactory. He appears to disregard entirely the narrative sequence of the text by directly contesting that there could ever be meaningful talk of 'day,' 'evening' and 'morning' without the existence of the sun, the moon and the stars that cause them. This is an embarrassing stance, to say the least, for an exegete who has built his whole career on the role of textual accuracy and the principle of *akolouthia* as the fundamental guideline for the interpretation of Scripture.<sup>87</sup> Or, there is something else going on in the background, something that proves Origen to be consistent with his own exegetical principles. This something could be, precisely, an interpretative approach that understands the events of the first three days in a non-physicalist manner and the events from the fourth day onwards in a physicalist manner. In this scenario, there would be no *physical* day, evening and morning, before the creation of the heavenly bodies. The meaning of the words would have to be different, signifying, for example, tropes of time-measurement, a purely metaphysical enquiry. Since we do not have the relevant part from Origen's lost *Commentary on Genesis* this suggestion remains speculative. But not every speculation is unwarranted. If we allow ourselves to read the Cappadocian exegesis back into the Origenian passage it is possible to maintain that Origen interprets the light of the creation narrative in a dual perspective: day one denotes the intelligible aspect of light; day four its physical instantiation. What grounds do we have for such a retrospective projection of Cappadocian interpretation? We have compelling evidence from the newly-discovered Munich collection of Origen's *Homilies on the Psalms* that the Cappadocian metaphysics of light goes back to Origenian material. We simply need to recall that the hermeneutical foundation of Basil's dual approach is the key distinction between the kindling (*phausis*) of light (*phōs*) on day one and the illumination (*phōtismos*) of the world through the luminaries (*phōstēres*) on day four. Recall further that this distinction is a direct adaptation of Origen's exegesis of Psalm 73:16, where Origen distinguishes between the kindling (*phausis*) of primordial light (*phōs*) on day one and the creation of the luminaries (*phōstēres* – *hēlios*) on day four. That clearly shows what I have already alluded to multiple times, namely that the Basilian metaphysics of light is a later adaptation of a genuinely Origenian exegetical theme. It also means that the projection of Basilian exegesis back into Origen is no anachronistic

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<sup>87</sup> As already noted the principle of *akolouthia* goes back to Stoic hermeneutics and is given hexaemeral expression in Philo's *Opif.* 28. The widespread view that Alexandrian exegesis is indifferent to the text relies on a superficial reading of the source material. On Origen's strong commitment to the exact interpretation of the letter of the text in the specific context of light-hermeneutics see *Hom. in Ps.* 73, III.2-3 GCS 253-6; on the principle of *akolouthia* in the same context see *Hom. in Gen.* 1.1 Baehrens 1.14-5.

interpretation at all. It is a mere interpretative strategy that helps us perceive the lost link between the passage from the *De principiis* and the *Homilies on the Psalms*. The missing link is the dual interpretation of hexaemeral light, an interpretation that must have been the subject matter of the *Commentary on Genesis* and which can still be recovered in its basic outlines from the mark it left on Cappadocian exegesis.

### 3. Philonic beginnings

Does the dual interpretation of hexaemeral light originate with Origen or can we trace it further back in the tradition? I would suggest Philo as the original source of inspiration. In the *De opificio* we are told that the primordial light (day one) is the intelligible paradigm of the physical light of the heavenly bodies (day four). The light of the sun, the moon and the stars is, in other words, the visible image of the archetypical, intelligible light of creation (§§29-33, 55). We have here the first instance of the double hermeneutics of hexaemeral light, metaphysical and physical. In the exegesis of day one we are given a metaphysical analysis of light: it is the type-token relation that connects the intelligible light and its sensible instantiations.<sup>88</sup> In the exegesis of day four the same type-token relation is repeated, but the emphasis is now on the physicality of light.<sup>89</sup> light is the most excellent of all sensible beings (*tōn ontōn ariston*); it is, further, the guiding principle (*organon*), necessary condition (*chreios ho ophthalmos phōtos*) and most beautiful object of vision (*pagkalōi kai theoeidestatōi*), triggering philosophical and scientific investigation (*hupo tou photos anō parapemphteisa hē horasis*); it is finally the substance of the stars (*phusin asterōn*) causing illumination (*tu phōsphorein*), producing the measures of time (*metra chronou*) and generating number (*arithmou phusin*).<sup>90</sup> True, the *De opificio* does not give us the Philonic physics of light. It adopts a metaphysical approach to creation, echoing strongly the Timaeian approach to the physical world, while the physics of light needs to be retrieved from the rest of the Philonic corpus through laborious study.<sup>91</sup> But the principle of light's hexaemeral exegesis is already established here: day one denotes light's intelligible aspect and day four its sensible aspect.<sup>92</sup>

The *De opificio* gives also a further hint, though this is a more suggestive one. The metaphysics of light appears to unfold on a double plane. On the one hand, the intelligible light fulfils a type-function as the archetypical light of creation (§29 *noēton paradeigma*). On the other hand, it also gives a token-function as the image, itself, of the intelligible *logos* (§31 *theiou logou eikōn*), who is, in turn, the realm of noetic archetypes or ideas (§20 *oud' ho ek tōn ideōn*

<sup>88</sup> See *Opif.* 29 (*asōmaton kai noēton paradeigma*); 30, 33 (*noēton phōs*); 31 (*pēgē tōn aisthētōn asterōn*).

<sup>89</sup> See *Opif.* 55 (*pros dē tēn tou noētou photos idean ekeinēn apidōn... edēmiourgei tous aisthētous asteras*).

<sup>90</sup> See *Opif.* 53-5.

<sup>91</sup> See, on this, the programmatic (but alas unfinished) study of Valentin Nikiprowetzky (1989). There is still no systematic study of the physics of light in Philo. As things stand, the best entryway are the comments of Runia (2001), *ad loc.* (§§29-35, 53-62).

<sup>92</sup> See Nikiprowetzky (1989), 9-10, 13-4. As Kugel (1998), 72 notes, a similar interpretative approach is also found in other Jewish authors (*Jubilees* 2:2 and the Qumran *Hymn to the Creator* 11QPs<sup>a</sup>) who tried 'to resolve the apparent contradiction between the creation of light on the first day and the creation of the sun and the moon on the fourth by suggesting the first day's creation of light was more theoretical than actual.' Runia (1989), 135, remarks that these parallel interpretations come 'strikingly close to what Philo intends with his "intelligible cosmos"' (with reference to *Jubilees* 2:2).

*kosmos allon echei topon ē ton theion logon; §24 noēton kosmon ē theou logon*). The double classification of primordial light as token (of the *logos*) and type (of all sensible light) has troubled Philonic exegesis, which regards Philo's move as a hermeneutical curiosum.<sup>93</sup> If, however, the Cappadocian dual interpretation is a distant echo of a hermeneutical tradition initiated by Philo and continued by Origen, the curiosum might finally find its proper explanation. One only needs to understand primordial light as the first manifestation of an immanent form in a Platonic ontological universe in order to allow for light's dual ontological status as both type (since form) and token (since image of a transcendent paradigm).<sup>94</sup>

An indirect confirmation of this suggestion comes from the parallel exegesis of the double creation of the human being (§§25, 67-76, 134-5). From the viewpoint of *Gen. 1*, the human being is approached in its intelligible aspect (§69 *nous*). *Gen. 1:26-7* denotes the creation of the generic human being (§76 *to genos anthrōpon*), i.e. the human being in its noetic-eidetic aspect (§134 *idea tis ē genos ē sphragis, noētos, asōmatos, aphthartos phusei*). According to a prevalent view, Philo here means the human species or humanity at large.<sup>95</sup> From the viewpoint of *Gen. 2*, however, the human being is approached in its sensible aspect (§134 *aisthētos*). *Gen. 2:7* denotes the creation of the particular human being (§135 *epi merous anthrōpou*) as a hylomorphic entity (*suntheton*), composed of form and matter (*ek te geōdous ousias kai pneumatōs theiou*) or of mind (*psuchēn, dianoian*) and body (*sōma*). *Gen. 1:26-7* then refers to the human *eidos* immanent in creation and *Gen. 2:7* to every particular physical instantiation of the human species. And since the human being of *Gen. 1:26-7* is at the same time the image of the image, i.e. of the divine *logos*, and the archetype of every individual human being, it enjoys the same dual ontological status of the light of the first day as the token of the *logos* and the type (or immanent *logos*) of the members of its class. Philo gives us a further hint that he theorizes the human being of *Gen. 1:26-7* in terms of an eidetic

<sup>93</sup> See Runia (2001), 168 (on §31), who decides to play the joker card: 'Perhaps the text is corrupt.'

<sup>94</sup> Since the ontological status of light is directly dependent on the ontological status of the *logos*, Philo's doctrine of the *logos* holds, here, the key to solving the puzzle. This is where the distinction of Wolfson (1962) between (transcendent) ideas 'in the mind of God' and (created) ideas 'outside the mind of God' comes in handy, especially since created ideas are understood as 'species' (*eidē*) and 'the genera of the particular objects,' i.e. immanent forms (pp. 204-17). The former (transcendent forms) are theorized as intelligible paradigms (*ideai*) of things, the latter (immanent forms) as intelligible causes (*dunamis*) of things (pp. 217-26). To these two aspects of Philonic intelligible objects correspond two aspects of the Philonic *logos*: the totality of the intelligible paradigms is the (uncreated) transcendent *logos*, while the totality of the intelligible causes is the (created) immanent *logos*. The latter stands in a relation of 'image' or token to the former (pp. 226-40). Though the methodology of Wolfson has been questioned, see Runia (1984), his grand systematisation between the two aspects of the *logos*, transcendent and immanent, still stands, see Runia (2001), 142-3. Dillon (1996), 159, repeats the same systematisation by distinguishing between (immanent) 'ideas in activity' and (transcendent) 'ideas at rest.' The ideas in activity function as the 'creative principles of the physical world' and are compared to the Stoic spermatic *logoi*. The dual ontological scheme of transcendence and immanence holds, in my view, the answer to the question of the ambiguous relation of light to *logos*. The light of the first day is the image or token of the transcendent *logos*, while the same light is the manifestation *par excellence* of the immanent *logos*. Thus, the identification of the light of the first day with the first immanent form (hence, by extension, with the first power of the *logos* and thus, synecdochically, with the immanent *logos* itself) solves the tensions as regards the relation of light to *logos* in the Philonic corpus. Interestingly, Wolfson (1962), too, understands the primordial light as the immanent form of light, including the light of the first day, in his examples of Philonic universals (p. 211). As van Kooten (2005) has recently shown, the Philonic connection between intelligible light and the doctrine of the *logos* is also found in the Johannine literature. If so, the hexaemeral hermeneutics of light can be derived from Johannine premises.

<sup>95</sup> See Runia (2001), 242-3 (§76) and the overview of interpretations in pp. 322-3.

universal or immanent form: he uses the technical jargon of genus and species (§76 *genos – eidē*, §134 *idea tis ē genos*).<sup>96</sup> I may be here striding a bit too fast over a series of delicate discussions in Philonic hermeneutics.<sup>97</sup> Be that as it may, the hard fact remains that there is an undeniable analogy between the double ontological status of light and that of the human being in the *De opificio*, an analogy that places light and the human species in a token-relation to the *logos* and a type-relation to their particular physical instantiations.<sup>98</sup> It is the same relation that we also find in the Cappadocian exegesis.

If my readings of Philo and Origen are plausible, we can establish a common thread of hexaemeral hermeneutics of light from Philo to Nyssen through Origen and Basil. Initially faintly visible, a certain theme surfaces gradually as the hexaemeral exegesis proceeds over the centuries. It is the theme of light as the *immanent* manifestation of the *logos* in creation, the light of the *logos* as it is revealed in and through the material world. Throughout the first four centuries of Jewish-Christian hexaemeral exegesis the idea was preserved that the light of the first day is a *lux intelligibilis*. Not, however, as a transcendent idea separate from the physical world, but as an immanent form distinguishable from its physical manifestations only in thought. This conceptual distinction *cum* ontological connection between intelligible and sensible light is what the dual interpretation of day one and day four of the creation narrative aims to express. The Cappadocian language of the ‘immateriality’ of light captures precisely this duality as hermeneutical ambiguity, allowing for a spiritualist and a physicalist interpretation of the light of creation. Behind this dual interpretative strategy hides more than just an apologetic response to erudite critics of Scripture contesting the logic of the creation narrative. On the one hand, the hexaemeral *physics* of light defends the coherence of the scriptural narrative and puts the entire ancient scientific arsenal at the service of biblical exegesis. On the other hand, however, the hexaemeral *metaphysics* of light pushes forward an agenda of its own, insisting on a particular approach to light that is intrinsically incarnational. From Philo to Nyssen, hexaemeral exegetes suggest that the study of physical light reveals something about the nature of the *logos* at work in the world. If this *logos* loves to hide and at the same time disclose itself through its works, the metaphysics of light shows that the works of the *logos* are never cut off from the physical world. Sure, the formative *logos* of light is an intelligible nature. But it is the beauty of its physical manifestation, the plain beauty of light shining in the world, that captures our imaginative attention and kindles the spark of genuine enquiry into our hearts. We may truly know light only in its intelligible

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<sup>96</sup> See the helpful discussion and further evidence by Tobin (1983), 112-7, with the necessary corrective of Runia (2001), 242-3 (§76), however, that the genus-species relation does not mirror the distinction between (transcendent) *eidos* and (immanent) *idos*, as Tobin thinks (p. 117), but belongs to the same ontological class of immanent species.

<sup>97</sup> For the hermeneutical difficulties see the already mentioned works of Tobin (1983) and Runia (2001). For my interpretation of these ambiguous passages I have followed, as a hermeneutical guideline, the metaphysical scheme provided in *Heres* 231: *Gen.* 1.27 signifies the individuated human intellect (*ton kath’hekaston hēmōn noun*), which is the image of the image (*ouchi eikona theou alla kat’eikona*), i.e. a second ontological remove from the universal *logos* (*archetupon [logon] ton huper hēmas*) and a third remove from the supreme divine intellect (*triton tupon apo tou pepoiēkotos*).

<sup>98</sup> Reinforced by the explicit ontological similarity between the luminous stars and the human being, who according to *Opif.* 73, both belong to the class of rational animals (*zōia noera*). The analogy of light with the human being is the main theme of Origen’s first (hexaemeral) homily on *Genesis*. It remains constantly in the subtext of the hexaemeral literature, emerging as an explicit hermeneutical theme in texts directly influenced by Basilian exegesis, see the third of the hexaemeral homilies appended to Basil’s *Hexaameron*, the *De Paradiso* GNO 75-84; Severian *In cosmogoniam* I.5-6 PG 56:436.



form, as a *lux intelligibilis*. But light creates that primal sense of wonder in the first place only because its *logos* is embodied. Creation is the place of the disclosure of the *logos*. The enquiry into the nature of light teaches us that if light's innate *logos* is always embodied, its disclosure must be inherently incarnational. As I will show in my concluding remarks, the incarnational metaphysics is the particular theological grammar of light's hexaemeral hermeneutics.



## CONCLUSIONS

‘He was the true light that enlightens every man coming into the world’ – yes, the Father. ‘He was the true light that enlightens every man coming into the world’ – yes, the Son. ‘He was the true light that enlightens every man coming into the world’ – yes, the Spirit. These are three subjects and three verbs – he was and he was and he was. But a single reality was. There are three predicates – light and light and light. But the light is one, God is one. This is the meaning of David’s prophetic vision: ‘In thy light we shall see light.’ We receive the Son’s light from the Father’s light in the light of the Spirit. (Gregory Nazianzen *Or.* 31.3 tr. Ayres)

This study began by revisiting the debate over the ‘metaphysics of light,’ how it took shape in twentieth century continental scholarship, and how it was imported in the English-speaking world, especially through Grosseteste studies. Two things became clear from the outset: first, the debate marched by the doorstep of early Church writers but it never really entered their literary world; secondly, the focus of the debate has been the *use* of light-language (metaphorical or analogical?) rather than its meaning (the concept of ‘light’ itself). The aim of this study has been to take the path that was not taken and discover something of the physical theories that shaped the concept of light in the early Church. To do this, I had to leave the existing discussion behind and embark on a new field of enquiry. My enquiry advanced in a threefold way, taking the form of a main argument building on two sub-arguments. The first chapter of this study argued that, against the claims of modern history of science, there was a genuine ancient physics of light operative in Jewish-Christian hexaemeral sources. The second chapter vindicated the relevance of the patristic physics of light for biblical exegesis, this time against ancient and modern critics of a scientific reading of Scripture. Based on these two sub-arguments, the study revealed, in a third and final step, the key features of a systematic theory of light reconstructed from the text, context and subtext of Cappadocian hexaemeral exegesis.

We have now completed the task that this study set out to perform, having recovered a substantial part of the meaning of light in the hexaemeral sources. It would be possible to carry the enquiry further, turning to the question of the theological use of light-language. Here, too, the hexaemeral literature would have a substantial contribution to make. Origen, in his hexaemeral homily, alternates between metaphor and proper use of language in his allegory of Christ as the light that illuminates the Church and every individual soul. Basil, in a brief and cryptic passage in his second hexaemeral homily, speaks unqualifiedly of the ‘intelligible light’ (*phōs noēton*) of the angelic realm, which preceded the creation of sensible light.<sup>1</sup> Nyssen, in his exegesis of the ‘Spirit of God’ (*pneuma theou*) hovering over the waters, according to Gen. 1:2b, briefly exploits the full range of the Nicene light-language to argue for the consubstantiality (*tauton tēi phusei; mia phusis*) of the Spirit of God with God himself in

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<sup>1</sup> See *Hex.* I.5 GCS 8.17-9.10; see also II.5 GCS 29.20-30.10: ‘the light above the heavens’ (*hyperouranion phōs*).

terms of divine light (*phōs ho theo, phōs kai tou theou to pneuma*). In this context, Nyssen speaks of divine light in the sense of a true predication (*phōs alēthinon*), which, however, builds on an equivocation (*dia tēs homonumias*).<sup>2</sup> Faithful to my methodology, I have so far resisted a mutation of my argument into a discussion about the use of language, and I intend to keep my methodology intact to the end. The answer to the question of how exactly the hexaemeral authors use the predicate ‘light’ with regards to the angelic (intelligible and created) and the divine (supra-intelligible and uncreated) world would require a proper investigation into the pre- and post-Nicene philosophy of language, which is another enquiry altogether. It suffices here to say that there has been substantial revisionary work conducted in this respect in the last decades.<sup>3</sup> What is still missing from the debate, however, is a stronger focus on the hermeneutical dimension.<sup>4</sup> It is in the latter, hermeneutical, dimension that I want to point with my concluding remarks, showing, merely programmatically, how the *hermeneutics of light* may contribute to a deeper understanding of the *theology of light* of the early Church.

A common way of understanding the light-imagery of the early Church is as a useful conceptual tool illustrating the unity-in-diversity of the divine persons. This view is expressed in the classic exposition of G.L. Prestige, according to which early Church thinkers ‘were groping after metaphors which should be capable of expressing unity in diversity,’ though, in the end, ‘they had no metaphors available to express such a conception with any degree of completeness.’<sup>5</sup> In Prestige’s view, ‘the metaphor of radiance and light was the traditional way of expressing the divine unity.’<sup>6</sup> This view was picked up and further developed by Jaroslav Pelikan, who, in his Gray Lectures in 1960, argued, citing Prestige, that the history of Christian doctrine of the first five centuries could be rewritten as the history of ‘the evolution of the image of light and radiance from rhetorical naïveté to theological subtlety and precision.’<sup>7</sup> According to Pelikan, the defenders of ‘Nicene orthodoxy,’ most notably Athanasius, had to fight hard to rescue light and fire from the imprecise use of images that was characteristic of the Arian camp.<sup>8</sup> In spite of the care and precision of the ‘Nicene’ doctrine, however, some of its most fundamental images, like that of the ‘Son of God’ and of the ‘*Logos* of God,’ had ‘connotations that did not belong in a Christian confession’ and had to be replaced with others ‘that were appropriate to Christian theology.’<sup>9</sup> The allusion was to Subordinationism and Sabellianism, and the image of light and radiance proved ‘extremely useful’ in counterbalancing the deficiencies of the images of sonship and *logos*, precisely because, in Athanasius’ writings, the radiance of God, though derived, was conceived as coequal in light with its source.<sup>10</sup> For Pelikan, anti-Nicene theologians wrongly claimed that

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<sup>2</sup> See *In Hex.* 19 GNO 31.7-32.13.

<sup>3</sup> See Williams (2002), 215-29; Kalligas (2002); Kobusch (2006), 72-83; Radde-Gallwitz (2009); DelCogliano (2010).

<sup>4</sup> The hermeneutical turn in patristic scholarship is anticipated by the reappraisal of the question of allegory that occurred in the last decades, see Louth (1983), esp. 96-131; O’Keefe and Reno (2005); Sheridan (2015). The need for a hermeneutical turn is advocated by some of the best revisionary studies in Nicene scholarship, see Ayres (2004), 31-40; Anatolios (2011), 108-33. For a compelling re-examination of the early Christian doctrine through the lens of scriptural hermeneutics see Behr (2001) and (2004).

<sup>5</sup> Prestige (1952), 103.

<sup>6</sup> Prestige (1952), 214; see also pp. 227, 243, 257.

<sup>7</sup> Pelikan (1962), 56-7.

<sup>8</sup> Pelikan (1962), 60.

<sup>9</sup> Pelikan (1962), 61.

<sup>10</sup> See Pelikan (1962), 63.

‘once, before the generation and creation of the Son, God the light had had no radiance or ray.’<sup>11</sup> To this Athanasius answered, drawing from an Origenian legacy, that there is no act of will separating God, who is light, from the eternal radiance that is his natural offspring.<sup>12</sup> According to this interpretation of pro-Nicene light-language, the eternal co-existence of light and its radiance was a useful ‘device’ in refuting the basic Arian tenet that ‘there was when he was not’ (*ēn pote hote ouk ēn*).<sup>13</sup>

Let us now briefly revisit the image of light in view of the knowledge that we have harnessed during our explorations of hexaemeral physics and compare it with the reading of pro-Nicene theology put forward by Prestige and Pelikan. The first thing to notice is that we are now in position to better understand and appreciate the theological language of light. To give an example: we can now perceive that the formula ‘light from light’ denotes simply the emanation of the light-ray from a luminous-fiery source. As I was able to show in the third chapter of this study, both the luminous source and the light-ray could be called ‘light.’ The reason for this choice of language, which is remote from how we use the term ‘light’ today, was hermeneutical. Early Christian thinkers were first and foremost interested in understanding and explaining Scripture. The term ‘light’ in the sense of ‘fire’ is attested in Plato, Plotinus and Greek philosophical poetry. As I have been arguing, however, it is from Scripture that the Church Fathers get the cosmology, physics and terminology of light. Today we can trace the lineage of the Nicene formula *phōs ek phōtos* to purely scriptural exegeses: it is anticipated by Philo in the expression ‘by light, light’ (*phōti phōs*), which he probably derived from the mystery cults to denote the vision of God;<sup>14</sup> it is first attested in the third century anti-heretical writings, who speak of ‘light from light’ (*phōs ek phōtos*) to denote the generation of the divine *logos* from God;<sup>15</sup> and it reaches the major actors of the Nicene debates through multifarious strands of Origenian lineage.<sup>16</sup> If we now turn to Origen, we see that the opening section of the *De principiis* is a powerful display of the whole gamut of *scriptural connotations* of ‘light’ and ‘fire’ with reference to God the Father.<sup>17</sup> The second chapter of the treatise explores the language of ‘radiance’ and ‘brightness’ applied to the Son in order to show, in a continuous argument from *scriptural exegesis*, the eternal co-existence of the Father and the Son, like the co-existence of the fire and its ray.<sup>18</sup> That means that, although there is a parallel line of Plotinian transmission of the terminology ‘light from light,’ to which modern scholarship has rightly brought attention, we do not need to borrow the

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<sup>11</sup> Pelikan (1962), 65.

<sup>12</sup> See Pelikan (1962), 66.

<sup>13</sup> Pelikan (1962), 62. For the continuing influence of this view see O’Collins (2012), 114-9 (following Pelikan); Tanner (2012), 124-5 (following Prestige). The instrumental interpretation of light-language is prevalent, see Ayres (2004), 41-3, 48-51: metaphors of light; 111-2: arbitrariness/appropriateness of light-analogies. Most recently so, Radde-Gallwitz (2018), 98-103: imagery and metaphor; question of adequateness. For the meaning of ‘metaphor’ in this context see my discussion in the Introduction.

<sup>14</sup> See Philo *Praem.* 45-6 and Goodenough (1969).

<sup>15</sup> See Hippolytus (?), *Contra Noetum* 10.4.4 and 11.1.3.

<sup>16</sup> On the Origenian background of the Nicene light-hermeneutics see Prestige (1952), 153-4, 193-4; Pelikan (1962), 60. As is well-known, Arius, Eusebius and Athanasius, to name only a few, developed their theological positions based on different interpretations of Origenian premises. What is often forgotten, however, is that all parties were rigorous in their interpretation of Origen, and that Origen cannot be held responsible for the hermeneutical choices of his interpreters, see, convincingly, Williams (2002).

<sup>17</sup> See DP I.1.1: *Deut.* 4:24; *1 John* 1:5; *Ps.* 35:10.

<sup>18</sup> See DP I.1.2: *Wis.* 7:24-6; *Heb.* 1:3; *John* 1:9; *John* 14:9; *Mk* 7:5; *Lk* 6:42.

lenses of Plotinian scholarship in decoding the pro-Nicene light-language.<sup>19</sup> The ‘metaphysics of light’ of the early Church had its own history and substantial existence, deriving its weight directly from scriptural exegesis. It belonged, like the scriptural passages that attested it, to the common heritage of the early Church, having no pro- or anti-Nicene label attached to it. No one contested that the meaning of expressions like ‘light from light’ was the relation of fire to the light-ray that emanates from it; nor that the equivocal use of the term ‘light’ with a twofold referent, as ‘fire’ and ‘ray,’ signified the intrinsic relation between the luminous source and its emanation. The whole question was how, exactly, to understand the relation of emanation. It is therefore highly misleading to approach early Christian thinkers as ‘metaphor-hunters’ chasing light-imagery as a convenient device for the expression of the Christian doctrine. The fact is that the light-language was normative for all parties involved in the theological debates because it was scripturally attested. It is important to realise that the language of ‘light from light’ was not the product of ‘Nicene orthodoxy.’ Only *a certain interpretation* of it was.

Let us now focus more closely on that interpretation. The classical view of Prestige and Pelikan leads to the widely-held assumption that pro-Nicene theologians denied the existence of an interval of time separating the fiery source from its ray.<sup>20</sup> This assumption comes together with the suggestion that pro-Nicene theologians reflected ‘more carefully’ on the physics of light that corroborates the Nicene light-language than their opponents did. In this view, the ‘Nicene’ physics of light allegedly defeats the main ‘Arian’ claim that there was a time when the Son was not. The standard reference is from Athanasius’ *De decretis*, a passage which asserts the co-existence of fire and light-ray:

For who can even imagine that the radiance of light ever was not, so that he should dare to say that the Son was not always, or that the Son was not before His generation? (*Decr.* XII.3 tr. Newman)<sup>21</sup>

The co-existence of fire and light is then used to illustrate the eternal co-existence of the Father and the Son:

the Word (*logos*) must be described as the true power (*dunamis*) and image (*eikōn*) of the Father, in all things exact and like the Father, and as unalterable, and as always, and as in him without division (for never was the Word not, but he was always, existing everlastingly with the Father, as the radiance of light) (*Decr.* XX.1 tr. Newman)

The Cappadocians can be quoted as expressing the same view. Basil says in his *Against Eunomius*:

For it is impossible that the God of the universe has not co-existed from eternity with his image who has radiated light non-temporally, that he does not have a connection with him that is not only beyond time but also beyond all ages. (*C. Eun.* I.20 tr. Delcogliano and Radde-Gallwitz)

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<sup>19</sup> On the Plotinian formula ‘light from light’ see *Enn.* IV 3.17.13–14 and VI 4.9.26–27. On the Plotinian metaphysics of light see Kalligas (2012). For the strong tendency to read the pro-Nicene theology of light from the backdrop of Plotinian metaphysics see Barnes (2001), esp. 90-2, 242-6; Ayres (2004), 249. On the controversial question of the Neoplatonic influences on the Cappadocians see my discussion on the ‘immateriality’ of light (3.1.2). I am here merely drawing the conclusions of the view I defended there.

<sup>20</sup> See, for example, Beeley (2007), 206 n.41: ‘Gregory [Nazianzen] holds the ancient view that the sun emits light instantaneously, taking no time.’

<sup>21</sup> Similarly, in *De sententia Dionysii* 15.

And Nyssen repeats in his own *Against Eunomius*:

Having come to comprehend the unbegotten light, from there we came in succession to understand the light from it like some ray co-existing (*sunuphistamenēn*) with the sun – its cause of being is from the sun, though its existence is simultaneous (*homou*) with the sun, since it does not accrue subsequently in time (*ou khronois husteron prosginomenē*), but rather as soon as the sun is seen, it too shines from it (*all' homou tōi ophthēnai ton hēlion ex autou sunanaphainomenē*). (C. Eun. 1.532 GNO 180.15-20 tr. Radde-Gallwitz)

Now, there is one main issue with these classical passages. None of them really tells us how physical light works. Instead, they all presuppose some basic knowledge about the propagation of light in the physical world, knowledge that they then apply to the theological issue at hand. We thus come, full circle, to the problem raised at the introduction of this study, which has also been the motive for my own enquiry: amidst the immense wealth of scholarly studies on 'Nicene' theology and its celebrated light-language, too little attention has been paid to the physical theories that corroborate the theological use of light-language. The reason for this scholarly neglect can now be called out. The discussion has revolved so much around doctrinal debates that it overlooked some of the most basic *hermeneutical concerns* supporting these debates. The hermeneutical concerns focused, of course, on the interpretation of Scripture, and Scripture starts at *Genesis 1* with the biblical creation narrative. As I have shown in this study, it is the hexaemeral literature that contains the most profound and exhaustive reflection on physical light, its nature and its properties, in the patristic corpus. Why the discussion never turned to the hexaemeral literature to explore the concept of light underlying the Nicene debates, remains, to me, a mystery.<sup>22</sup>

Let us then go back, for a final time, to the hexaemeral sources, and briefly recall the discussion about the propagation of light. We there saw that the transmission of light in space takes place instantaneously (for Basil: *akariaiōs*; for Nyssen: *euthus*), a picture which entirely supports and confirms the theological passages cited above from Athanasius, Basil and Nyssen. In the same chapter, however, we also saw that 'instantaneously' means that the light-ray covers a distance in space in an infinitesimal length of time (*en oxelai kairou rhopē*), conceivable only in thought (*mēdemias parataseōs chronikēs*). As I there argued, this would only be possible if light was conceived of as traveling at infinite speed. Moreover, I there remarked, it is empirically impossible to perceive with the senses and express adequately in language the difference between an *instantaneous* transmission of light (since infinite speed requires an infinitesimal interval of time for light to appear, even if this interval is conceivable only in thought) and a *simultaneous* presence of light (in which the co-existence of fire and ray is not interrupted by any interval of time whatsoever). If my interpretation of the sources is correct, the Cappadocian physics of light opts for the first alternative of the instantaneous *transmission* of the light-ray travelling at infinite speed. It thus requires an interval of time for the ray to emanate from its source, even if that interval is so small that it is not empirically attestable. If this interpretation is correct, the Cappadocian physics of light fully supports the

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<sup>22</sup> There is a growing awareness of the importance of the hexaemeral literature for the Cappadocian metaphysics of power causality, especially in Nyssen studies, see Barnes (2001), 255, 266, 278-88; Ayres (2004), 314-21; Ayres (2002), 454-5, 457, 462; Radde-Gallwitz (2018), 15-7. Interestingly, not even these studies explore further the relevance of the hexaemeral literature for the Cappadocian concept of light. The closest we get is Barnes' treatment of fire and heat.

Arian claim, contrary to the established view. According to Cappadocian physics, *there was a time when the light-ray was not*; not empirically attestable time, since the ray propagates at infinite speed, but time conceivable only in thought. This is, however, the Arian thesis. Contrary to what mainstream patristic scholarship would have us believe, the Cappadocian physics of light, together with its Origenian inspiration and Athanasian confirmation, corroborates the anti-Nicene theology of light, not the pro-Nicene one. It also shows that Arius and his followers were thorough and exact in their use of light-language.

This is surely an unexpected conclusion, which immediately forces the question: If pro- and anti-Nicene theologians shared the same physics of light, what was the real point of contention in the Nicene controversy over light-hermeneutics? My answer is straightforward: the point of contention was not the physics, but the metaphysics of light. The point of contention could not have been how light appears in the phenomenal world, since all parties agreed that it appears quasi-simultaneously with fire. Nor could it have been about the mathematics of propagation, which, as everybody agreed, stipulated light's infinite speed. The point that Athanasius and the Cappadocians raised against their opponents was that the latter did not go far enough as regards their *conceptual analysis* of light. The charge against Arianism could then only be that the latter theorized light based on the domain of appearances (physics) instead of exploring the domain of intelligible causes (metaphysics). Take a fresh look at the cited passages from Athanasius, Basil and Nyssen. The first passage from the *De decretis* invites us to conduct a thought experiment ('who can imagine'), shifting the debate from the realm of empirical reality to the realm of logical possibility. But the latter is the realm of pure metaphysics. The second Athanasian passage confirms that we are now dealing with ontology, having left behind phenomenology: the mode of temporality involved is eternity, which means that the subject matter is addressed from its ideal perspective. The issue at hand, is a certain metaphysical relation: the relation of substance to its natural capacity or power. Athanasius's message is clear: it is the 'logic' of light, its ideal structure, that reveals the relation of the Father to the Son. This is the same relation as the metaphysical relation of a substance to its natural property. The Basilian passage confirms this view by also asserting that the mode of temporality involved in our discussion is beyond that of the phenomenal world. Similarly, Nyssen's passage confirms that the issue at hand is causality and not temporality, i.e. the *internal* structure and not the *external* manifestation of light.

The key passage on the theological interpretation of the metaphysics of light is from Basil's *Contra Eunomium*, a few lines after the passage I just quoted above. Basil here calls out Eunomius for (intentionally or unintentionally) neglecting that the purpose of light-language is not to provide a physical analogue of divine generation but to give an explanation thereof in terms of metaphysical causation. What is theologically relevant, Basil argues, is the intrinsic causal link of light to its source, a link that is revealed *not* in terms of *temporal* succession but in terms of the *akolouthia* of nature, i.e. light's logical structure. By contrast, the factor time is here irrelevant:

He [sc. Eunomius] has either not understood or purposely concealed the fact that there is a kind of order which is not established by our imposing it but which is found in the natural sequence of things. An example of the latter is the kind of order between fire and the light which comes from it. In these cases we say that the cause is prior and that which comes from it is secondary. We do not separate these things from one another by an interval, but through reasoning we conceptualize the cause as prior to the effect. So, then, in the case of things in which there is a prior and a secondary, how is it



reasonable to deny that there is an order which exists not by our imposing it, but from the natural sequence that exists in them?

... the Father is ranked prior to the Son in terms of the relation that causes have with what comes from them, not in terms of a difference of nature or a pre-eminence based on time. (C. *Eun.* 1.20 tr. DelCogliano and Radde-Gallwitz)

The reader who has been patient enough to follow my argument up to this point will surely remember the importance of the *akolouthia* of nature as the guiding principle of hexaemeral exegesis. In the first chapter of this study, I argued that the hermeneutical principle of *akolouthia* initiates the reader of Scripture into a gradual anagogical ascent from the world as it appears to the senses to the world as it appears to the intellect. In the second chapter, I showed that the quest for the *akolouthia* of Scripture is the hermeneutical counterpart to the metaphysical quest for the *logos* of nature, the creative aspect of divine intelligence responsible for the inner structure of the world. The same idea now appears emphatically in Basil's anti-Eunomian writings, showing that the doctrinal debates were firmly grounded on scriptural hermeneutics: the *akolouthia* of Scripture reveals the *akolouthia* of nature; the *akolouthia* of nature reveals the *logos* of light; the *logos* of light reveals the mode of divine generation. It is a mode that lies beyond the realm of temporal contingency, a realm that is revealed to us once we learn to leave behind the phenomenal world and turn our attention to its noumenal structure. The pedagogy required for this re-orientation of our attention is our initiation into the contemplative reading of Scripture. By reading and re-reading the hexaemeral narrative, the able reader gradually learns to move from the contemplation of complex life-forms to the contemplation of simple patterns in nature, the apex of which is light. The point that Basil, and with him all pro-Nicene theology, raises against dissonant voices is deeply hermeneutical. Behind the deviant interpretations of light lies the illegitimate conflation of the phenomenal world with its noumenal structure. It is not the physics but the metaphysics of light that reflects the mode of divine generation. Just as the physicist needs to get her facts right, so does the metaphysically minded theologian need to get her interpretation of Scripture right. The contemplation of the *logos* of Scripture initiates the reader to the contemplation of God's own *logos* in the world. In the words of Lewis Ayres:

The activity of divine persons, as seen in creation and described in Scripture, is of a character that shows God's power (and hence the divine nature) not to be individuated as is human nature. ... God has created a world whose order and structure is (at infinite remove) a reflection of God's own power. Because God has created the world in this way, the logic of power and activity that we see in God's creation should reveal to us something of God's activity and power. On this basis Gregory [sc. of Nyssa] can assert that through observing God's activity—which should be seen in creation and is narrated in Scripture—we can see that God's one power works always by a unitary causal sequenced activity of the three persons.<sup>23</sup>

At the end of the third chapter of this study, I provided a full description of the scheme of metaphysical causation that explains the propagation of light from its source, producing the phenomenon of illumination. My analysis coincides with the analysis provided by Michel Barnes in his seminal study on the notion of 'power' (*dunamis*) in Gregory of Nyssa.<sup>24</sup> In his study, Barnes showed how the axiom 'one power, one nature' was the fundamental tenet of pro-Nicene theology, acquiring in Nyssen the form of a fully developed causal scheme, expressed as the continuous sequence: nature (*phusis*) – power (*dunamis*) – activity

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<sup>23</sup> Ayres (2002), 462.

<sup>24</sup> See Barnes (2001).

(*energeia*) – product (*ergon*).<sup>25</sup> My study reached the same conclusion as Barnes, through an independent route of enquiry, but also extended the causal scheme to include the correspondences between the semantics, physics, metaphysics and analytics of light. Let us now apply the chart to one particular episode of the Nicene controversy to better understand how the rivalling parties disagreed over the metaphysical interpretation of the causal relation of the luminous substance (fire) to its power (light-ray). As Barnes has shown, the Eunomian metaphysics of light adopts a simpler causal scheme from the Cappadocian.<sup>26</sup> On the Eunomian account, fire relates to light as cause to effect. This interpretation could claim for support Aristotle’s classical theory of light in the *De anima* II.7, which identified ‘light’ with the illumination of space (light as ‘actualisation of the transparent’). The Aristotelian theory could justify the Eunomian attribution of causality since the illumination of space was, indeed, the *external* end-product of the presence of fire in the medium. At the end of the fourth century, however, this was not a satisfactory analysis of light anymore. The full conceptual analysis had to also give an account of the *internal* stages of the process that led to the illumination of external space. And this account passed through the light-ray and the activity of the light-ray on the medium, which were both left out of Eunomius’ analysis. In providing a full analysis of the causal chain of light, the Cappadocians showed that the Eunomian attribution of light in the sequence of metaphysical causation was deficient. They also showed that the cause of illumination was one, but it was not solitary. Illumination resulted through the transmission of brightness from a luminous source to the medium. For the transmission to take place, however, a threefold set of necessary and sufficient conditions needed to be present, namely a luminous source (fire), its power (ray) and its activity upon the medium (irradiance). The product was one, but the agency that brought it about was threefold.

There are two consequences of this reading of the fourth-century light-hermeneutics, and with these remarks we reach the end of this study. The first consequence, I have already alluded to. At the heart of the trinitarian and christological debates of the Nicene ‘theology of light’ was not the physical interpretation of light but the metaphysical. The key to the transition from the phenomenal aspect of light to its noumenal structure was given in the hexaemeral narrative. The contemplative reading of *Genesis* 1 was the rite of passage from the physics to the metaphysics of light. This was not because ‘the Bible says so,’ but rather because the biblical text itself was the product of Moses’ contemplation of nature (*phusikē theōria*), a contemplation that was handed down to Moses’ disciples in the form of a creation narrative. Everyone able to emulate, through a contemplative reading of the narrative, Moses’ anagogical ascent from the current state of multiplicity to the primordial state of unity of the world, would acquire the vision (*theōria*) of creation from the top of Mount Sinai. It is this Mosaic anagogy that runs through Nyssen’s *Apology*, summarizing in this respect four centuries of hexaemeral exegesis. The *theōria* of nature was not a subjective experience of the reader. Following the logic of the cosmological argument, the performative ascent from complexity to simplicity revealed the inner structure of creation, the intelligible abode of the demiurgic *logos* of God. The pathway from unity to multiplicity was coded in the narrative form of a creation account portraying the appearance of the phenomenal world in six stages, from the first light to the birth of humanity. By penetrating the veil of the letter of Scripture, the reader could discover under the six cosmic stages an equal number of contemplative

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<sup>25</sup> For the full scheme see Barnes (2001), 303.

<sup>26</sup> See Barnes (2001), 278-88.

steps, leading back to the first manifestation of the *logos*. All that was required was to re-read the hexaemeral narrative, this time backwards, contemplating the created order through an inverse prism, from the sixth to the first day. The reader who would succeed, would transpose herself hermeneutically to the beginning of God's creative act. From here she could contemplate the building blocks of creation, and how they were skilfully combined by God's creative power, the *logos*, to produce the material world. Light was the first creative act of this *logos*, revealing in its simple and homoiomerous nature the primordial unity of created being. And since every artefact conveys something of the artistic genius that produced it, the skilled reader would finally perceive, in contemplating the light, the reflection of divine intelligence shining through the world. This reflection Moses put down in words at the opening chapter of *Genesis*. It is the kind of reflection that runs through the whole body of the hexaemeral literature. Out of this reflection grew also the early Christian theology of light.<sup>27</sup> The Nicene light-language is, therefore, neither arbitrary nor opportune. Light is the first and simplest manifestation of sensible reality. As such, it reveals in the clearest possible way the internal structure of phenomenal being. By contemplating the light, we suddenly become aware of the incomprehensible beauty of the divine intelligence that conceived and produced being as we experience it. The theology of light aims to express something of this unfathomable beauty, from which (*ex hou*), through which (*di' hou*) and in which (*en hōi*) everything that is acquires its existence.

The second and final consequence flows naturally from the first. Hexaemeral anagogy is deeply rooted in the hermeneutical interplay of two modes of being, the phenomenal and the noumenal. Light illustrates this interplay in the clearest possible way. As I showed in the third chapter of this study, the *logos* of light is perceived through the constant dialectics of the first and fourth day of creation, each day revealing one of light's double aspect, the phenomenal and the noumenal. The exegetical dynamics between light's two aspects, reveals the metaphysical chain of causation through which the innate *logos* manifests in the world: as a luminous power springing forth from a luminous source. The dialectical interplay between light's double aspect, intelligible and sensible, as hermeneutical requirement for the contemplation of light's innate *logos*, is what I meant when I concluded, at the end of the third chapter of this study, that the metaphysics of light is inherently incarnational. There can be no form of light without matter nor material light without form, though, of course, for the purposes of metaphysical analysis form must be clearly distinguished from matter. The *logos* of light is not just the first *logos* of creation, but also the first *embodied logos*, what Grosseteste would later call 'the first corporeal form.' To the extent that every particular being instantiates an embodied *logos*, qua form-in-matter, light exhibits the universal pattern of embodiment for all created being. This pattern is nothing less than the chain of metaphysical causation revealed in the sequence: substance – power – activity – product. In the case of light, the product is illumination. In the case of divinity, the product is the cosmos. In the case of humanity, the product is civilization and culture. The metaphysics of light contains the pattern of creation and the right causal analysis holds the key to deciphering it. Just as illuminated space reveals light's illuminative power, so does the world reveal God's

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<sup>27</sup> This point has been fully argued by McGuckin (1994): The anagogical ascent is the proper matrix of all pro-Nicene theology of light.

creative power. Similarly, a work of art reveals the creative power of human imagination.<sup>28</sup> All three manifestations of the *logos* – human, cosmic and divine – exhibit the same pattern of metaphysical causation: a metaphysics of power. As already mentioned, however, this is an always-embodied and creative power. We know this because the incarnational metaphysics of light tells us so. In his first hexaemeral homily, Severian of Gabala makes a spectacular suggestion about light’s incarnational nature:

Since light was God’s first work and the human being God’s final work, God first makes the light with a word and later the human being with an action, completing light with light. To learn how a human being is also light, listen carefully. Light shows what is in existence; the human being is the light of the world, and at his entrance he showed you a light of artifice, a light of knowledge. The light showed grain, intelligence made bread; the light showed grapes of the vine, the light of understanding showed the wine in the grapes; the light showed wool, the human’s being light showed clothing; the light showed a mountain, the light of understanding showed stonecutting. This is the reason why the Savior also calls the apostles light in saying, “You are the light of the world” [Mt 5:14] (*In Cosmogoniam* 1.6 PG 56:436 tr. Hill)

In deliberately using equivocal language for illumination and human civilization, Severian is alluding to a true and symmetrical relation of correspondence between light and intellect. The relation of correspondence is visible in the common pattern of metaphysical causation that light and intellect exhibit. Light is the first instantiation of the *logos* in nature; the human intellect is the first instantiation of this *logos* becoming aware of itself. By contemplating the light, we learn something about the nature of the world we inhabit; by contemplating human artistic production, we learn something about ourselves. Yet, we are creatures of this world, like every other created entity. Learning about the world is also learning about who we are. And learning about who we are is also learning about the world we inhabit. This seems to be Severian’s suggestion in speaking about ‘light contemplating light.’ How the contemplation of light occurs is the whole point of hexaemeral pedagogy. As Severian implies, however, by quoting the Sermon on the Mount, the hexaemeral narrative contains only a map for the anagogical ascent. The journey itself is narrated elsewhere and through a different literary form as the story of the life of Jesus. It is the gospel that narrates the anagogical journey of ascent: epiphany, transfiguration, resurrection, are some of the key stages in the transformative experience of the human intellectual self, exemplified archetypically in Jesus, as it awakens to the primeval unity, simplicity and beauty of nature’s indwelling *logos*. This is a story that Moses’ account of creation anticipates but does not tell. Faithful to Moses’ divine pedagogy, Basil avoids any explicit reference to Christ in the main bulk of his hexaemeral exegesis. In the last homily, however, Basil’s exegesis culminates in an anticipatory vision of Christ as the *logos* of nature taking human form. This study, too, culminates in vision similar to Basil’s, anticipating Christ as the embodied *logos* of light taking on human form – or so I have hoped. For it is not the place of the hexaemeral exegete to divulge the mystery of light embodied, but only to hint at it.

In his magisterial Hulsean Lectures, Rowan Williams argued that the christological vision of creation offers a metaphysical model of embodiment, according to which created and uncreated being mutually, though asymmetrically, converge. This convergence, which takes

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<sup>28</sup> For the contemporary revindication of the role of creative imagination for theological metaphysics see the ground-breaking trilogy of Hedley (2008), (2011) and (2016). For the particular relevance of Hedley’s thesis for the ‘metaphysics of light’ see Hedley (2013), 541 (light as manifestation of the transcendent).

flesh in the person of Christ, enables all patterns of created existence to find their meaning.<sup>29</sup> In this study, I have continually implied that William's metaphysical model of embodiment is the model of the *logos* of light incarnate. It is this *logos* that was revealed as the firstborn of all creation, and it is the same *logos* that continues to dictate the metaphysical grammar of all created existence. The gospels narrate how this *logos* takes flesh in the person of Jesus. By the time we reach the fourth century, the Christian embodied metaphysics culminate in the credal affirmation that Christ is the *logos* of light that came down from heaven and became man. In this study, I have argued that the divine command '*fiat lux*' was the first manifestation of the universal-yet-always-embodied *logos*; that the 'grammar' of this *logos* is inherently hermeneutical, revealed in the continuous interplay of phenomenal light and its intelligible structure; that this interplay is reflected in the hexaemeral dialectics of the first and fourth day of creation; and that the hexaemeral dialectics entails the metaphysical chain of causation that explains how the *logos* of light manifests in the world. The emergence of this *logos* in the literary world of Scripture is what I have called the 'hexaemeral metaphysics of light.'

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<sup>29</sup> See Williams (2018), esp. xi-xvi.



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