

## DISCUSSIONS ON THE ETERNITY OF THE WORLD IN ANTIQUITY AND CONTEMPORARY COSMOLOGY

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ABSTRACT: This contribution continues the comparison between ancient and modern beliefs on scientific cosmology which began in a previous article in this Journal ([ΣΧΟΛΗ 5.2 \[2011\]](#)). I begin with a brief survey of contemporary theories on Big Bang cosmology, followed by a study of the cosmological theories of the Presocratic thinker Pherecydes of Syros. The second part of my paper studies the ramifications of the basic Platonic principle that *bonum est diffusivum sui*. I begin by studying the vicissitudes of this theory in the Patristic thought of Origen, the Arians, and Athanasius. Following Willy Theiler, I suggest that similarities between the views of Origen and the Neoplatonist philosopher Porphyry of Tyre may be traceable to Plotinus' teacher Ammonius Saccas. Finally, following Endress, I study the way the Arabic translation of some propositions from Proclus' *Elements of Theology* were accompanied by interpolated glosses derived from the Christian Neoplatonist John Philoponus, which were designed to make Proclus' thought more acceptable to a creationist, Monotheistic belief system such as Islam. Philoponus' theories of instantaneous creation were taken up, thanks to al-Kindi, by the Neoplatonica Arabica, whence they exerted an important influence on the development of Islamic thought. An Appendix of texts with translation and bibliography completes the article.

KEYWORDS: creation, cosmology, Big Bang, Pherecydes, Origen, Athanasius, Plotinus, Porphyry, Ammonius Saccas, Proclus, John Philoponus, al-Kindi, Neoplatonica Arabica.

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## I. CONTEMPORARY COSMOLOGY AND THE PRESOCRATICS

*Quid tamen ante hunc mundum fuerit, aut quid post mundum erit, iam non pro manifesto multis innotuit.*

Yet what existed before this world, and what will exist after the world, still remains unclear to many.

Origen, *De principiis*, I Praef. 7, p. 94 Görgemanns / Kapp

In my contributions to these Workshops<sup>1</sup> over the last two years, I've tried to give some indications of the way in which ancient thinkers – philosophers, theologians and mythologists – sometimes raised questions and provided solutions that paralleled those given by modern cosmologists.

The present article continues these studies. I'll start with a very basic and amateurish sketch of contemporary cosmology, before moving on to discuss a potential precursor to Plato's idea of creation of the world by the Demiurge, in the Presocratic philosopher Pherecydes of Syros. I will then present a brief excursus into the philosophy of the Christian Church Fathers, before finishing off with a short discussion of some medieval Arabic texts known as the Plotiniana Arabica.

Here, to begin with, is a very schematic summary of what one might call contemporary mainstream views on the origin of the universe.

### 1. The Big Bang: a brief history

As it is well known, Albert Einstein developed his theories of relativity in the first decades of the twentieth century (the special theory was published in 1905, the general theory in 1915).<sup>2</sup> In 1919, the general theory received a spectacular confirmation when Sir Arthur Eddington travelled to an island of the coast of West Africa during a total eclipse, and observed that starlight was indeed bent by the sun, just as Einstein had predicted. As far as cosmology was concerned, however, Einstein believed in an unchanging universe, neither increasing nor decreasing in size, and so, in 1917, he included in his equations a quantity called the cosmological constant (or rather “the cosmological term”), which allowed an unchanging universe to be derived mathematically.<sup>3</sup>

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<sup>1</sup> At Novosibirsk University, Siberia, in the context of the project “TEXNH, Theoretical Foundations of Arts, Sciences and Technology in the Greco-Roman World”, organized by the Centre for Ancient philosophy and the classical tradition and sponsored by the Higher Education Support Program of the Open Society Institute. Cf. Chase 2012.

<sup>2</sup> “Special relativity determines the motion of particles in space-time, while general relativity describes the behavior of space-time itself” (Bojowald 2010, 78). This is not the place for even a cursory survey of Einstein's theories. For popular-level accounts, see, for instance, Thorne 1994, 59-129; Lockwood 2005, 23ff.; Davies 1995, 45ff. *et passim*; Carroll 2010, 67-118.

<sup>3</sup> Davies 1995, 135-40; Frank 2011, 158ff. The cosmological constant, which Einstein later discarded, calling it his ‘greatest mistake’, was to reappear over half a century later in the

As we saw last year (Chase 2012), it was the Russian mathematician Alexander Friedmann who, in 1922, discovered on the basis of Einstein's equations that the curvature of the universe's space-time depends on the amount of matter it contains. We'll see a bit later that this question has a crucial impact on the question of the universe's eventual destiny. But it was above all Edwin Hubble's discovery in 1929 that the universe is in fact expanding<sup>4</sup> that caused Einstein to withdraw his cosmological constant and concede that the universe is not static after all. In fact, it was space itself was expanding, "carrying the galaxies along with it like pennies glued to an expanding rubber sheet".<sup>5</sup>

The Belgian priest Georges Lemaître, building on the results of Einstein, Friedmann, and Hubble,<sup>6</sup> soon developed a theory that led to the current standard view of a universe emerging from a point<sup>7</sup> of infinite density. As late as the 1950s, such Cambridge cosmologists as Thomas Gold, Hermann Bondi and Fred Hoyle<sup>8</sup> were defending a steady-state theory in which, as Aristotle believed, the universe remained much the same for eternity.<sup>9</sup> Since then, the discovery of the cosmic microwave background radiation by Penzias and Wilson in the mid-1960s,<sup>10</sup> followed by evidence obtained in 1998 for the acceleration of the expansion of the universe,<sup>11</sup>

guise of dark energy; cf. Wilczek 2008, 105ff., and Appendix.

<sup>4</sup> Hubble made this discovery thanks to the powerful new Hooker telescope, based on the red-shift of distant stars (stars moving toward earth would display light near the blue end of the spectrum; those moving away would display red-shifted light, since the frequency of a departing light source moves toward the red end of the spectrum: Bojowald 2010, 249). Hubble concluded that all galaxies were moving away from each other, with their velocities increasing as a function of their distance from us. Cf. Davies 1995, 130ff.; Carroll 2010, 45-48; Frank 2011, 152ff.

<sup>5</sup> Frank 2011, 166.

<sup>6</sup> On Friedmann and Lemaître, see for instance Davies 1995, 135ff.; Luminet 2010; Hooper 2006, 142f.; Frank 2011, 182ff.

<sup>7</sup> Or rather, in Lemaître's terms, a "primeval atom"; cf. Carroll 2010, 54.

<sup>8</sup> Penrose 2010, 68. Hubble's initial observations confirming the expansion of the universe, which convinced Einstein to drop the cosmological constant he had introduced to guarantee an unchanging universe, predicted an age for the universe of only about 1.8 billion years (Davies 1995 132ff.). The steady-state theorists were reacting, among other factors, to this erroneous estimate. Cf. Eccles 1979, 12-13 (and note that when Eccles was writing some thirty years ago, the *communis opinio* held that the universe was "about nineteen billion years according to the best estimates" (*ibid.*)).

<sup>9</sup> Carroll 2010, 54-55; Panek 2011, 13ff.; Frank 2011, 202f. This theory postulated the continuous creation of matter, in the form of hydrogen molecules at the rate of one atom per cubic meter per billion years.

<sup>10</sup> In 1990, the Cobe satellite (Cosmic Background Explorer) determined the temperature of this cosmic background radiation to be 2.725 degrees Kelvin, or about -270.4 degrees Celsius (Hooper 2006, 153). This temperature was remarkably homogeneous throughout space.

<sup>11</sup> Greene 2011, 128ff. The story of this discovery, made jointly by the Supernova

have led to the widespread acceptance of the Big Bang theory, although still not all scientists are convinced. In particular, this theory presupposes infinite values or singularities at its very beginnings, and singularities or infinite results in equations are usually the sign that something's wrong with a theory. The theory of relativity also predicts that if we made a film of the evolution of the universe and ran it backwards, time itself would come to an end at the Big Bang.<sup>12</sup> These and similar considerations have led some influential theorists<sup>13</sup> to prefer some version of a cyclical model in which the universe expands, ceases its expansion after about a trillion years and undergoes a turnaround, contracts, and finally, when a certain bounce temperature value is reached, undergoes expansion once again, with the process as a whole repeating itself *ad infinitum*.<sup>14</sup> Ironically, some contemporary theorists who posit the existence of a multiverse, or virtually infinite number of universes eternally coming into existence, have recently come up with what has been described new kind of steady-state model.<sup>15</sup>

Recent commentators have not failed to point out the similarities between such contemporary cosmologies and Neoplatonic theories, aligning Simplicius with the steady-state theorists and Philoponus with the Big-Bang theorists. Let's briefly review the basic similarities and differences (**Table 1**).

Simplicius, following Aristotle, believes the world was never created. It had neither a beginning nor end, but has always existed in precisely its present state and will always continue to do so. If Plato in the *Timaeus* appears to say the world was created by the Demiurge, he is speaking allegorically, and really means to refer only to the fact that the world is ontologically dependent on a higher principle. If we take the *Timaeus* literally, as Philoponus did,<sup>16</sup> we have a universe that has a beginning but no end. Philoponus, for his part, believes the world was created instantaneously by God

Cosmology Project and the High-Z Supernova Search Team, is recounted in Panek 2011.

<sup>12</sup> Bojowald 2010, 31. The same conditions may occur inside black holes, which produce “an apparent tear in the fabric of space-time” (Frank 2011, 256), but this is not the place to deal with this fascinating subject, on which see, for instance, Thorne 1994; Susskind 2008; Bojowald 2010, 178ff.; Carroll 2010, 259ff.

<sup>13</sup> For instance, Roger Penrose, Lee Smolin, Robert P. Kirshner, Paul H. Frampton, Paul J. Steinhardt, Neil Turok. Loop quantum gravity proposes to eliminate the singularity problem by postulating a discrete or quantized time and space. cf. Bojowald *passim*. Sean Carroll, for his part, prefers a model in which the Big Bang represents an eternally-recurring phase transition between states of empty space and new “baby universes”, which go on to expand and produce new universes, which in turn evolve into a state of empty space.

<sup>14</sup> Frampton 2010, 96-97; Frank 2011, 251ff.

<sup>15</sup> Frank 2011, 290. Sean Carroll, perhaps the most prominent advocate of such views, defends a model in which the Big Bang – or rather *our* Big Bang, since there are an infinity of them, and ours has nothing special about it – represents an eternally-recurring phase transition between states of empty space and new “baby universes”, which go on to expand and produce new universes, which in turn evolve into a state of empty space ...

<sup>16</sup> Particularly in his *Against Proclus on the eternity of the universe*. Cf. Chase, in press.

some 6000 years prior to his epoch, and will end whenever God chooses to end it, although God will then create a superior, permanent world in its place. Time, as Plato stated in the *Timaeus*, and Philoponus agrees, was created simultaneously with the world, and God created matter from nothing. A final possibility was defended by the Stoics: the world alternates eternally between destruction in a fiery conflagration (*ekpurôsis*) at the end of a Great Year, followed by its periodic recreation.<sup>17</sup>

What's now popularly known as the Big Bang Theory<sup>18</sup> postulates that the universe came into being some 13.7 billion years ago. Starting out from an initial singularity in which matter was infinitely dense and the geometry of spacetime was of infinite curvature,<sup>19</sup> the universe is supposed to have gone through roughly the following stages (Table 2)<sup>20</sup>:

1. Since their temperatures were too high to be reproduced in a laboratory environment,<sup>21</sup> not much is known about the initial phases. Of these, the first is known as the Planck epoch (down to  $10^{-43}$  seconds post Big Bang), when it is presumed that the four fundamental forces – Gravity, electromagnetism, and the strong and weak nuclear forces – were united.

2. The second phase ( $10^{-43}$  to  $10^{-36}$  seconds PBB) witnessed the separation of these forces, by means of the process of symmetry breaking.<sup>22</sup> The first to separate were the strong and the electroweak forces<sup>23</sup> (i. e., the combination of the electromagnetic

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<sup>17</sup> Cf., for instance, D. Sedley 2007, ch. VII, with further literature. It is no accident that the theory introduced by J. Khoury, B. Ovrut, P. Steinhardt and N. Turok, according to which our universe periodically collides with another one that is situated within a space-time of more than four dimensions, has been baptised as the *ekpyrotic* scenario. See Steinhardt & Turok 2007 *passim*; Bojowald 2010, 88; 245.

<sup>18</sup> The term was introduced by Fred Hoyle in 1949 in order to make fun of the theories of Lemaître, then adopted, minus its pejorative connotations, by George Gamow (Luminet 35; Penrose 2010, 253).

<sup>19</sup> Brax 75; Penrose 2010, 64.

<sup>20</sup> There is, of course, much disagreement among experts on virtually all these facts and dates, and they may all be rendered obsolete within a very short time indeed.

<sup>21</sup> The temperature at the time of Grand Unification may have reached  $10^{29}$  degrees; but to reproduce such a temperature experimentally would require a particle collider the size of our solar system (Hooper 2006, 94). Temperatures of over  $10^{12}$  degrees have been recorded at the Brookhaven relativistic heavy ion collider (RHIC) (Wilczek 2008, 93), and this figure will certainly be surpassed in the near future.

<sup>22</sup> Thought to occur when temperatures reach about  $10^{27}$  degrees (Steinhardt & Turok 2007, 83; Lockwood 2005, 99).

<sup>23</sup> The strong nuclear force governs interactions between nucleons (protons, neutrons, and quarks), binding quarks and gluons together to form protons, neutrons, and other hadrons, and binding protons and neutrons to one another within the atomic nucleus (Penrose 2010, 141; Seife 2003, 122-123; Wilczek 2008, 239), while the weak forces are responsible for nuclear decay, changing up quarks to down quarks, or neutrinos into electrons (Seife 2003, 265).

force and the weak force). Once the temperature had cooled to about  $10^{15}$ , the electroweak force then separated into the electromagnetic and weak forces.<sup>24</sup>

3. Beginning about  $10^{-36}$  seconds after the Big Bang and lasting a mere  $10^{-30}$  seconds,<sup>25</sup> the universe is thought to have undergone a period of inflation,<sup>26</sup> or exponential growth, during which it expanded by a factor of between  $10^{30}$  and  $10^{100}$ , if not more, doubling in size every  $10^{-32}$  seconds. Although global inflation ceases after a very brief time, current versions of the theory predict that it continues in some isolated regions, thus giving rise eternally to a practically infinite number of universes.<sup>27</sup> According to Alan Guth and his followers, inflation is nothing other than a phase transition,<sup>28</sup> like the freezing of ice or the curdling of milk, analogies which, we remember, Philoponus and his predecessors and successors used to describe God's creation of the universe. Yet we may also recall from last year<sup>29</sup> that Simplicius maintained that such phase transitions or instantaneous changes were not really instantaneous; they happened bit by bit, albeit very rapidly. Similarly, Guth and his colleagues supposed the early universe was pervaded by a field of energy known as the "false vacuum", a field that was inherently unstable and would at some point<sup>30</sup> have to decay, in a phase transition like the appearance of bubbles in a boiling pot of water,<sup>31</sup> into a real vacuum, releasing a tremendous amount of energy in the process.

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<sup>24</sup> Lockwood 2005, 99-100.

<sup>25</sup> Cassé 91; Penrose 2010, 66; Hooper 2006, 196.

<sup>26</sup> Inflation was first proposed the Soviet cosmologist Alexei Starobinsky in the 1970s (Lockwood 2005, 100), and then, independently, by Alan Guth in 1981, with refinements by A. Linde, P. Steinhardt and A. Albrecht (Luminet 2010, 39; Greene 2010, 44). The theory of inflation has recently been called into question (Luminet 2010, 41; Magueijo 2003; Penrose 2010; Frampton 2010; Steinhardt & Turok 2007). It remains popular, however, because it seems to solve several outstanding cosmological problems: the flatness problem, or why the universe is so flat when it could very easily have been curved; the horizon problem (cf. Bojowald 2010, 151-152), or how it can be that parts of the universe so distant that they can never have interacted causally still display very similar features, such as CMB temperature; and the magnetic monopole problem, or why these types of particles, which should have been created in abundance when the electromagnetic, strong, and weak forces emerged from the single Grand Unified Force, have never been observed. On these issues cf. Lockwood 2005, 99-100; Hooper 2006, 189 ff.; Carroll 2010, 320ff.; Panek 2011, 127ff. Inflation also solved the apparent improbability of the large-scale homogeneity and isotropy of the universe (Panek 2011, 144; Frank 2011, 245 f.). For parallels between the inflationary model and the theories of Anaximander, cf. Bojowald 2010, 246.

<sup>27</sup> Hooper 2006, 199. Compare this with the number of universes predicted by string theory, which is in the order to  $10^{500}$ , that is, 1 followed by five hundred zeroes (Hooper 2006, 184; Frank 2011, 273; 277ff.).

<sup>28</sup> Carroll 2010, 325ff.; Panek 2011, 127; Frank 2011, 280f.

<sup>29</sup> Chase 2011, 142.

<sup>30</sup> A point determined by random fluctuations at the quantum level, at least in subsequent elaborations of Guth's theory (cf. Lockwood 2005, 10).

<sup>31</sup> Frank 2011, 281.

This energy would assume the form of a kind of anti-gravity, ripping apart the fabric of space-time and causing, almost instantaneously, the exponential expansion of the universe. Even more radically, in developments of the theory pioneered by Alexander Vilenkin and Andrei Linde,<sup>32</sup> such inflation is always taking place someplace in the universe, giving rise to a multiverse containing a virtually infinite number of universes, some of which would be in a state of false vacuum, and others, like ours, would have already decayed to a real vacuum state.

In our universe, at any rate, inflation is supposed to have been followed by a number of subsequent periods:

4. From about  $10^{-30}$  seconds after the Bang, the universe was dominated by radiation and consisted of an opaque plasma made up of radiation, matter, and antimatter. As the universe expanded and cooled, the particles of matter and antimatter annihilated each other, leading to a surplus of matter which coalesced into electrons and quarks.<sup>33</sup> This phase was then succeeded by another, in which

5. As the universe's temperature dropped to about  $10^8$  Kelvin,<sup>34</sup> the period of nucleosynthesis began at about one second PBB. It was characterized by nuclear fusion, in which protons and neutrons combined to form stable atomic nuclei. The first elements to form in this way were the lighter ones: hydrogen, helium, deuterium, and lithium, in that order.<sup>35</sup> This phase signals the beginning of domination by matter instead of radiation.<sup>36</sup> This phase was followed by

6. A period known by various names: as the phase of decoupling,<sup>37</sup> recombination, or the surface of last scattering, occurring some 379,000 years PBB, when the temperature had dropped to 3000-4000 K. At this point, increasingly cool temperatures allowed electrons to be captured by protons to form hydrogen and helium atoms. The ubiquitous photons emitted by the hot big bang, which had previously been absorbed almost instantaneously, now no longer interacted with matter in the guise of the newly-formed atoms, and were free to travel unimpeded throughout the cosmos, forming the cosmic microwave background radiation that was to be discovered by Penzias and Wilson in the 1960s. Finally, we come to

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<sup>32</sup> Frank 2011, 283 ff.

<sup>33</sup> Steinhardt & Turok 2007, 58. Why matter and antimatter did not annihilate each other completely is still something of a cosmological mystery (Bojowald 2010, 160f.).

<sup>34</sup> That is, some 10,000 times the surface temperature of the sun (Greene 2011, 38).

<sup>35</sup> Bojowald 2010, 161.

<sup>36</sup> As Carroll points out (2010, 58), in a cosmological context matter simply means "any collection of particles, each of which is moving much more slowly than the speed of light". Conversely, particles moving at or near the speed of light are considered radiation.

<sup>37</sup> The decoupling in question is that between matter (in the form of atoms) and radiation, made possible by the fact that the newly formed atoms, now electrically neutral, no longer interacted with the photons (Greene 2011, 38-39; Panek 2011, 45; Hooper 2006, 149f.; Frank 2011, 206).

7. the last phase, the one in which we now live, characterized by accelerated expansion and dominated by a fluid-like entity called “dark energy”,<sup>38</sup> whose precise nature remains unknown. This period has witnessed the formation of stars and galaxies (about one billion years PBB), and finally of our own solar system (9 billion years ago) and the earth (about 4.5 billion years ago).

## 2. Back to the future

As far as the question of the universe's future is concerned, that is, whether its existence is or is not (spatio-)temporally infinite,<sup>39</sup> it has, since Friedmann and Lemaître, been linked to the question of the geometry of space (Table 3).<sup>40</sup> If the cosmological constant is taken to be zero, we have the following three possibilities:

a. A universe with positive curvature, which contains enough matter to eventually cause the universe, through the force of gravity, to stop expanding, implies finite time and space; that is, a universe beginning with the Big Bang and ending with a Big Crunch. In this model, then, the universe is closed, finite, unbounded, and hyperspherical.<sup>41</sup>

b. A universe with hyperbolic geometry with negative curvature, in which the angles of a triangle add up to less than 180° and there is relatively little matter, implies a saddle shaped universe infinite in time and space. On this hypothesis, the universe will expand forever at an increasing rate, eventually leading to an empty world. Astronomers have dubbed this option the Big Chill.

c. Finally, a zero-curvature universe with Euclidean geometry, such as seems to be the universe we live in now, in which the total matter density is precisely the critical level,<sup>42</sup> also implies an universe that expands forever. Here, however, the rate of expansion slows down, so that expansive and gravitational energies are in perfect, and delicately unstable, balance,<sup>43</sup> so much so that it has been called the Goldilocks uni-

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<sup>38</sup> Dark energy, a repulsive force associated with or perhaps identical to Einstein's cosmological constant (Penrose 2010, 254) which accounts for the universe's accelerated expansion, makes up about 70-75% of the current universe (Lesgourgues 19; Luminet 40, Vannucci 61, Brax 83, Vanhove 127). A figure of 72% was confirmed by the WMAP satellite in 2003 (Frampton 2010, 63). See Appendix.

<sup>39</sup> Or rather perpetual (Greek *aidion*), since all the Friedmann-Lemaître possibilities assume the world has a beginning in time, at the singularity of the Big Bang.

<sup>40</sup> Friedmann's assumption that the universe is homogeneous – that is, that it has the same density of matter everywhere, which implies that the universe's curvature should also be identical everywhere – basically restricts the possibilities of the universe's shape to three (Magueijo 2003, 89).

<sup>41</sup> Lockwood 2005, 95-96.

<sup>42</sup> The critical density of matter is approximately  $2 \times 10^{-29}$  grams per cubic centimeter of space, equivalent to six hydrogen atoms per cubic meter (Greene 2011, 23-24), or one gram per hundred trillion cubic kilometers of space (Hooper 2006, 162).

<sup>43</sup> Magueijo 2003, 89ff.; Penrose 2010, 62ff.; Panek 2011, 58; Frank 2011, 164. Frampton

verse, because, like the famous bowl of porridge, it is “just right”. The universe, on this hypothesis, would be infinite and flat.

This, at any rate, was the *status quaestionis* up until 1998, when the discovery of the accelerated expansion of the universe, which began some seven billion years ago<sup>44</sup>, led to the hypothesis of dark energy.<sup>45</sup> The future of the universe now seems to depend crucially on what is called the equation of state (ratio of pressure<sup>46</sup> to energy density, which cosmologists designate as  $w$ ) of dark energy. We now find ourselves faced by two main possibilities (**Table 4**).

1. If the equation of state is equal to  $-1$ , there should be a specific amount of energy per unit of volume of space, and that density should not change over time.

2. If  $w$  is other than  $-1$ , dark energy would turn out to be quintessence, its density grows with time, and the scale factor of the universe<sup>47</sup> soon becomes infinite. Some ten billion years from now, time ends and everything is torn apart at the Big Rip by the repulsive gravitational force of dark energy.

As of early 2010, the WMAP results gave an equation of state of  $-0.98$ , which is close enough to  $-1$  to mean that dark energy does indeed appear to be a cosmological constant. It also reported that some 72.8 per cent of the universe consists of dark energy, another 22.7 per cent of dark matter, and only about 4.56 per cent in the form of baryonic matter,<sup>48</sup> or the matter to which we have become so accustomed, that which is made up of atoms.

We thus appear to be living in a world that is not going to end anytime soon, thanks to an almost miraculous fine-tuning<sup>49</sup> of the ratios between the elements that constitute it.

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2010, 25, 72f. specifies that the universe currently matches this point of “critical density” within a margin of 2%. On the experimental findings confirming the flatness of our universe, notably those of the BOOMERANG experiment in April of 2000 and the WMAP experiment a few years later, see for instance Bojowald 2010, 137-141; Hooper 2006, 183 f.

<sup>44</sup> Greene 2011, 139-140.

<sup>45</sup> In 2001, the cosmologist Michael Turner went so far as to say that in a universe with dark energy, “the creation between geometry and destiny is severed” (quoted in Panek 2011, 208). On dark matter and dark energy, see Appendix.

<sup>46</sup> Here, pressure means the negative change in energy divided by the change in the volume enclosing the energy amount (Bojowald 2010 146).

<sup>47</sup> That is, the relative distances of the galaxies from one another (cf. Greene 2011, 134).

<sup>48</sup> Figures differing by 2-3% are given by Frank 2011, 248.

<sup>49</sup> This notion of fine-tuning raises important and complex questions of Intelligent Design and the Anthropic Principle, which we cannot go into here.

## II. PHERECYDES OF SYROS

*One can find among the Pre-Socratics most of  
the elements of modern cosmology.  
Martin Bojowald<sup>50</sup>*

It has often been claimed, including by me last year,<sup>51</sup> that the Demiurge in Plato's *Timaeus* represents the first appearance in Greek thought of what might be called a creationist cosmology, that is, a scheme according to which, as the Aristotelian commentators were to say, the world came into existence or was generated after not having existed.<sup>52</sup>

I now believe that assertion is mistaken. It fails to take into account the tradition of Pre-Socratic philosophy, and even if one may hesitate to agree with David Sedley, who finds instances of creationism throughout Presocratic philosophy, I believe that at least two trends or figures from the Presocratic period deserve serious consideration as precursors to the Platonic *Timaeus* in this regard. One is the so-called Orphic texts, where the doctrine of creation from an egg (*ab ovo*) by some kind of a demiurgic figure seems securely attested. The other is represented by the meagre remains of Pherecydes of Syros, the shadowy sixth-century philosopher whom some claimed was the student of Pittakos<sup>53</sup> and teacher of Pythagoras,<sup>54</sup> and whom others, with perhaps a greater claim to verisimilitude, have identified as the first Greek author to

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<sup>50</sup> Bojowald 2010, 248.

<sup>51</sup> Cf. Chase 2011, quoting Cornford, who, writing in 1937, wrote that in the *Timaeus* “Plato is introducing into philosophy for the first time the image of a creator god”. Along the same lines, cf. Classen 1962.

<sup>52</sup> This was the last of the seven meanings of the Greek word *genêtos* enumerated by Porphyry; cf. Baltès, 1976, 105-121. According to Simplicius (*In Phys.*, CAG 10, p. 1154, 3ff.), this is the sense in which Aristotle used the term *genêtos*, while Plato used it to designate that which, like the sensible world, has its being in becoming and subsists as a result of some external cause, rather than on its own. These correspond to Porphyry's meanings 3 and 4, which he took over from Calvisius Taurus.

<sup>53</sup> On this isolated tradition (Diogenes Laertius I, 116), cf. Goulet 2001, who supposes a mistake on the part of Diogenes Laertius. Pittakos of Mytilene, one of the Seven Sages, was said to have died c. 570-569.

<sup>54</sup> Porphyry, VP 55. For additional attestations cf. Schibli 1990, 11 & n. 24; Breglia 2000, p. 162 n. 11, and especially Goulet 2001.

write in prose.<sup>55</sup> The title of his only known work, as attested by the *Suda*, seems to have been “The seven nooks, or The mixture of the gods, or Theology”.<sup>56</sup>

### 1. The cosmology of Pherecydes

In view of the paltry number of fragments of and testimonies to his work that have come down to us, not all of the details of Pherecydes' cosmogony can be reconstructed with certainty. This much seems reasonably clear, however<sup>57</sup>: in the beginning were three everlasting<sup>58</sup> divinities: Zas, Chronos,<sup>59</sup> and Chthonie. Chronos then produces from his own semen,<sup>60</sup> perhaps by masturbation,<sup>61</sup> the three elements fire,

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<sup>55</sup> Schibli 1990, 2-4; Laks 2007; 2009. Pherecydes' only serious rival for this honor is Anaximander, who may have been a few years older and who some (Diels, Von Fritz) consider to have influenced Pherecydes. Schibli however (*loc. cit.*), followed by Laks (2007, 257 n. 42) argues for the chronological priority of Pherecydes over Anaximander. Cf. Scofield in the *Routledge History of Philosophy*, vol. 1 (London-New York 1997), p. 73 n. 20, for whom Pherecydes' case to be the first prose author is “stronger [sc. than that of Anaximander] if not overwhelming”.

<sup>56</sup> Fr. 2 Schibli = A2 Diels-Kranz: Ἐπτάμυχος ἦτοι Θεοκρασία ἢ Θεογονία. Since there seem to be only five nooks in Pherecydes' cosmology, West (1971, 13), following Preller *et multos alios*, proposes to emend the *Suda*'s text to read *pentamukhos*, “the five nooks”. *Contra*: Schibli 46 n. 105. A substantial part of the notice on Pherecydes in the *Suda* may go back to the *Philosophos Historia* of Porphyry. See A.-Ph. Segonds, “Les fragments de *l'Histoire de la philosophie*”, in E. des Places, ed. & trans., *Porphyre, Vie de Pythagore, Lettre à Marcella*, Paris: Les Belles Lettres, 1982, 163-197, fr. 6 at p. 181.

<sup>57</sup> Cf. Schibli 1990, 14ff.; 128ff.; Breglia 2000, 178ff.

<sup>58</sup> *einai aei* fr. 60 Schibli = A8 D.-K. = Damascius, *De princ.*, 1, 321 Ruelle = vol. II, p. 164, 17ff. Westerink-Combès; *êsan aei* fr. 14 Schibli = A1, B1 D.-K. = Diogenes Laertius 1, 119 (where, however, *êsan* is only Diels' conjecture – albeit probably a good one – for the mss. readings *hês*, *eis*, and *heis*; cf. R. Lambertson, *Ancient Philosophy* 12. 2 [1992], 384). For Laks (2009, 638), it is this eternity Pherecydes assigns to his divinity/principles that provides the “quelque chose de philosophique” partly explaining why Aristotle (*Metaph.* N, 4, 1019a33ff. = fr. 81 Schibli) classes Pherecydes among the “mixed thinkers”, halfway between mythology and philosophy. Cf., however, Schwabl 1962, 1463, who points out that that idea of the eternity of primary forces is “zumindest im Orient uralt”. The other reason for Aristotle's classification is Pherecydes' revolutionary use of prose rather than verse; cf. Laks 2009, 641.

<sup>59</sup> Fr. 60 Schibli = Damascius, *De princ.*, 1, 321 Ruelle = vol. II, p. 164, 17ff. Westerink-Combès. On this reading, see below.

<sup>60</sup> West 1983, 199-200 suggests that in the Orphic cosmogony (OF 66; 70), Chronos may likewise produce the World-Egg from his seed.

<sup>61</sup> As is frequent in Near Eastern traditions; cf. West 1971, 28ff.; 1983, 103ff.; Schibli 1990, 37f.

breath or spirit (*pneuma*),<sup>62</sup> and water. Deposited in five “realms” or “nooks” (*mukhoi*), these elements then somehow give rise to a second generation of gods.<sup>63</sup>

Another series of fragments tells of the preparations for a wedding between Zas and Chthonie. Zas weaves a robe (*pharos*) for his bride-to-be, on which he embroiders Earth, Ogenos (Ocean),<sup>64</sup> presumably understood as a great river surrounding the habitable earth, and the palace or halls (*dômata*) of Ogenos. When Chthoniê accepts the robe, in a gesture that founds the Greek custom of the *anakaluptêria*,<sup>65</sup> her name is changed to that of Gê.

Other Pherecydean fragments are harder to situate within the narrative's logic: we are told, for instance, that Zas, when about to carry out his acts of creation (*mellonta dêmiourgein*), transforms into Eros,<sup>66</sup> and that the robe constituting Zas' wedding gift to Chthonie was, at a stage of the story that is hard to determine, hung upon a winged oak.<sup>67</sup> Also at some point or another,<sup>68</sup> Chronos' sovereignty is challenged by the serpentine Ophioneus and his army<sup>69</sup>: those who are toppled into Ogenos are to

<sup>62</sup> Wind, according to West 1983, 199. Modern commentators usually neglect Testimony A5 Diels, according to which Pherecydes distinguishes two kinds of *pneuma* in man, divine and earthly. An exception is Gomperz 1928, 24f. Schibli (109-113) is sceptical of this tradition, but cf. Lamberton 390.

<sup>63</sup> Fr. 60 Schibli = A8 Diels = Damascius, *De princ.*, I, 321 Ruelle: *ex hôn* [sc. the elements] *en pente mukhois diêirêmenôn pollên allên genean sustênai theôn*. Schibli supposes that Chronos forms the gods by mixing the elements in various proportions.

<sup>64</sup> On the form of the word *ôgênos*, see the references given by von Fritz 1948, 2029, 52ff., and especially West 1971, 50. Gomperz' etymologizing explanation (1928, 21), that the river surrounds *gê* like an O, is picturesque.

<sup>65</sup> The groom did indeed give gifts to the bride on the third day of ancient Greek wedding; cf. Diels 1897, 149.

<sup>66</sup> fr. 72 Schibli = B3 Diels.

<sup>67</sup> Diels (1897) thought Zeus hung the *pharos* on the oak tree as soon as he finished weaving it, then handed the whole kit and caboodle over Chthonie as a wedding gift: while not impossible, this scenario seems somewhat grotesque. There is no agreement among modern commentators as to what the symbol of the winged oak might mean. It may refer to the loom on which the *pharos* is woven (Gomperz 1929, 22; *Contra*: Schwabl 1962, 1463); or to the ship's mast on which Athena's *peplos* was hung in the Panathenaic procession (Diels 1897); it may personify Chthonie (Jaeger 1947, 69-70), perhaps as “substructure of the visible earth” (Granger 142); or else it may take her place (West 1971, 20; 59); or else there may be no particular connection between Chthonie and the oak (Kirk-Raven-Schofield). Finally, the winged oak may simply personify Zas, and be winged because this god is not subject to the constraints of temporal reality (Breglia 2000, 187). Most recently, Saudelli (2011) interprets the winged oak as the body of the universe, while the *pharos* (which she translates as “veil”) represents the visible surface of the universe.

<sup>68</sup> Probably after the marriage of Zas and Chthonie (Schibli; Breglia 179), although Vernant (see below, n. 70) placed the battle before the wedding, as does Gomperz (1929, 21) and Schwabl (1962, 1462).

<sup>69</sup> Granger (2007) maintains that Zeus' peace-loving proclivities kept him out of the fight,

be declared the losers, while the winners gain possession of Olympus (fr. 78 S. = B4 D.-K). Chronos wins the battle and is crowned victor (fr. 82 S. = B4 D.-K.), but Zeus may later have taken over sovereignty from Chronos<sup>70</sup>, if we can judge by the fact that it is Zeus, not Chronos, who has the power to banish evildoers to Tartarus (fr. 83 S. = B5 D.-K.).<sup>71</sup> It may be after this victorious struggle that Zeus assigns to the gods their various realms of jurisdiction.<sup>72</sup>

Despite the uncertainty of the details, it seems more or less certain that Pherecydes has a notion of a double creation,<sup>73</sup> taking place against the background of and in contrast with the three everlasting deities Zas, Chronos, and Chthonie. In the first stage, as we have seen, Chronos creates the three elements fire, *pneuma* and water, from his own seed. After they have somehow been distributed into five nooks or realms, these elements give rise to another plentiful generation of gods (fr. 60 S. = A8 D.-K.). A second stage, which may represent the creation of living, organic beings,<sup>74</sup> seems to be represented by Zas' demiurgic activity, which is envisaged as equivalent to his weaving the *pharos* and presenting it as a wedding gift to Chthonie.

It is the relation between these two stages, phases, or accounts of cosmogony that we must understand in order to gain an adequate grasp of Pherecydes' philosophy, and hence judge the extent to which his thought may be considered to constitute a precursor to Plato's figure of the Demiurge. First, however, it seems appropriate to take a closer look at the notion of time in Pherecydes.

## 2. Time and Eternity in Pherecydes

The mention of Chronos as one of Pherecydes' three everlasting principles has led to a great deal of controversy over the past century or so. Fr. 60 Schibli, taken from Damascius' *On first principles*, gives the unambiguous reading Χρόνον,<sup>75</sup> but Zeller<sup>76</sup>

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although this author seems to deduce, bizarrely, that Zeus is "peace-loving" merely because he is an amorous weaver. Schibli, for his part (1990, 97-99), supposes Zeus engages in a *monomakhia* with Ophioneus. The figure of Ophioneus is echoed in Orpheus' song in the *Argonautica* of Apollonius of Rhodes (I, 502ff.); cf. also the Scholiast to Aristophanes' *Clouds* 247, who speaks of a first race of gods under Ophion and Euronyme.

<sup>70</sup> Vernant (*Les Origines de la pensée grecque*, Paris 1962, 107-108), assumes that Zeus replaces Chronos as the result of an "assault" and a "conquest". Schibli (1990, 68) disagrees, arguing the takeover was peaceful.

<sup>71</sup> Cf. Schwabl 1962, 1463; Schibli 1990, 40.

<sup>72</sup> Schibli 1990, 178.

<sup>73</sup> Cf. Bojowald 2010, 236: in myth, "primary creation provides a reason for the emergence of the world itself, secondary creation for the world as we find it now".

<sup>74</sup> Diels 1897, 155; Von Fritz 1948, 2031.

<sup>75</sup> Vol. III, p. 164, 17 Westerink-Combès. Schibli's apparatus criticus, reproduced from Wehrli (*Die Schule des Aristoteles, Texte und Kommentar. 8, Eudemos von Rhodes*, Basel/Stuttgart 1969<sup>2</sup>, fr. 150, p. 70) is inaccurate here. The reading of the Marcianus Graecus 246 (Ruelle's ms E), unique witness to the works of Damascius, is not "χθόνον E<sup>ac</sup>" but "χθόνον E<sup>pc</sup>". Mss BFW all depend on this correction of the Marcianus.

and Wilamowitz<sup>77</sup> argued that a personified figure of time was too abstract for a thinker of the sixth century, for which reason Wilamowitz wished to emend the manuscript reading to Κρόνον.<sup>78</sup> Yet Diels had already argued strongly against such an emendation,<sup>79</sup> pointing out that the figure of a personified Time was frequent in archaic Greek thought.<sup>80</sup> Perhaps the most interesting examples of this tendency come from the Plato's uncle Critias, who, in his drama *Peirithoos*, described Chronos as an imperishable stream that generates itself,<sup>81</sup> while in his *Sisyphos*<sup>82</sup> Critias spoke of “the starry skin of the heavens, fine embroidery of Chronos, that clever craftsman”. Note that the word *tektôn*, here used to qualify Chronos, is for all intents and purposes a synonym of *dêmiourgos*.

Quite apart from what one might call the “mainstream” of Greek archaic thought, the notion of a personified time is far from absent<sup>83</sup> in at least two contexts that may

<sup>76</sup> Zeller-Mondolfo 1932, 187-188 n. 4.

<sup>77</sup> S.-Ber. Akad. Berl. 1929, 41: “Ich halte einen Urgott Zeit im 6. Jahrhundert für undenkbar”. But cf. West 1971, 28, for whom such a view is “based on a misjudgement of the capabilities of pre-philosophical speculation”.

<sup>78</sup> H. Fränkel (*Wege und Formen frühgriechischen Denkens*, München 1960<sup>2</sup>, 19) also defended the emendation to Cronos. He was followed by Lesky (*Geschichte der griechischen Literatur*, München 1999<sup>3</sup>, 192 n. 2), and Schwabl (1962, 1459ff.), who nevertheless concedes that the notion of eternal creative principles is well attested in Near Eastern and other contexts. He cites *inter alia* the birth of the gods from Kumarbi in Hittite mythology; the self-generation of the Egyptian god Atum, from whom the other gods derive; the self-generation of the Phoenician god Ulomos, etc. As “parallel Oriental Time-gods”, West (1983, 198f.) adduces the Egyptian Re', the Iranian Zurvân, and the Indian Kâla. Cf. West 1971, 10; 29-36; Schibli 1990, 17 & n. 9. Brisson (1985, 50), who also inclines toward the emendation to Cronos, seeks to derive the Orphic Chronos from Zurvân, but for the possibility that Zurvân may instead derive from the Chronos of Pherecydes, cf. M. Boyce, *A History of Zoroastrianism*, vol. II (Leiden 1982), 152.

<sup>79</sup> Diels 1897, 151, emphasized that Diogenes Laertius and Damascius (who in turn depends on Eudemus, two testimonies that are clearly independent of one another), read Chronos, not Cronos, as occurs in the Stoic-influenced testimonies of Probus and Hermias. It is not hard to imagine, Diels argued, that an author of the Orphic period should have placed a personified Time at the origin of his cosmology. Quite apart from the Orphics, he continued, one need only think of the Aion of Heraclitus, or the personifications of time in the near-contemporary works of Greek tragic and lyric poets.

<sup>80</sup> More examples were soon adduced by Nestle and Gomperz: Pindar *Ol.* II, 19; Simonides 531.5 Page; Sophocles fr. 280 Nauck; Euripides *Heracleid.* 900, fr. 304, 3; *Herac.* 776 ff.; Solon fr. 36, 3 West, Anaximander fr. 9 Diels. Schibli (1990, 29 n. 39) adds further references.

<sup>81</sup> Fr. 3 Snell = D.-K. 88B18: ἀκάμας τε χρόνος περί τ' ἀενάω / ρέυματι πλήρης φοιτᾷ τίκτων / αὐτὸς ἑαυτὸν.

<sup>82</sup> fr. 19 Snell = D.-K 88b25, 33-34: τό τ' ἀστερωπὸν οὐρανοῦ δέμας, / Χρόνου καλὸν ποίκιλμα, τέκτονος σοφοῦ.

<sup>83</sup> Von Fritz 1948, 2029, citing Zeller-Nestle I<sup>6</sup>, 104.

well have been influential on Pherecydes: the Orphic poems and the mythologies of the Near East. The latter have been thoroughly discussed by West, so that we can leave them aside here, but we will return to the Orphics shortly.

Given that some sources attest that Pherecydes identified elements and the (modified) divinities of Greek religion,<sup>84</sup> many scholars have subscribed to one version or another of a hypothesis first set forth by Diels (**Table 5**). For Diels, Pherecydes' five *mukhoi* are to be identified with the five elements aether, fire, air, water, and earth. Here, the two extreme terms Zas and Chthonie, considered as eternal, are identified with aether and earth respectively, while the three elements produced by Chronos<sup>85</sup> – fire, air and water – are temporal, and hence subject to change, generation, and corruption. In Pherecydes, then, at least according to Diels, we have a clear distinction between a realm of eternity, represented by Zas and Chthonie, and world of time, represented by the other three elements.<sup>86</sup> Chronos would thus be responsible for heavenly phenomena, while all phenomena of life on earth result from the *hieros gamos* between Zeus and Chthonie. Variations on this theme were proposed by most subsequent scholars, most of whom subscribed to Diels' fundamental distinction between an eternal and a temporal realm of gods/elements.

Finally, Schibli, in a complex scheme that has not been well received by scholars,<sup>87</sup> distinguishes between the five nooks (*mukhoi*) in which Chronos deposits his seed, and where the second generation of gods are born, from seven regions (*moirai*) attributed to divinities – all members of the *pentemukhos genea* that emerged from the elements ejaculated by Chronos – that inhabit and rule over each of them. Schibli seems to want to recognize the existence in Pherecydes of both a kind of proto-time and a kind of proto-space.<sup>88</sup> One may find such notions too metaphysical for a sixth-

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<sup>84</sup> Probus, *In Buc.*, 6, 31, fr. 65 S. = A9 D.-K.: Zen = fire, Chthon = earth, Cronos = time; Hermias, *Irrisio gentilium philosophorum*, 12, fr. 66 S. = A9 D.-K.: Zen = aithêr, Chthonie = earth, Cronos = time. On the identification of Zeus with aither, cf. the references in Schibli 43-44 n. 90.

<sup>85</sup> By Zeus, rather than by Chronos, since Diels, following Kern and Nestle, emends the *heautou* of fr. 60 S. into *autou*, so that its meaning is that Chronos creates the elements out of the seed of Zeus. This emendation has been rejected by most subsequent scholars (Zeller I 1<sup>6</sup>, 105 n. 2; Gomperz 18 n. 10; von Fritz 2031; Schwabl 1461; West 1971, 12; Schibli 18 n. 11; Westerink-Combès, vol. III, 233-234 n. 4).

<sup>86</sup> Cf. Von Fritz 2031.

<sup>87</sup> See, for instance, Breglia 2000, 178-179, and the reviews by D. Sider, *BMCRev* 1 (1990) 80-81, and especially R. Lambertson, *AncPhil* 12 (1992) 383-39.

<sup>88</sup> The *mukhoi*, as “dark, womb-like hollows” (Schibli 1990, 22), perhaps situated within the body of Chthonie/Earth, are in some sense not fully real until Chronos deposits his elemental seed in them. After the gods are born from them, “the *mukhoi* too assume a reality of their own as specific areas of the cosmos” (p. 23). Prior to this stage of the cosmogony, however, the *mukhoi* “defy definition” (p. 25). They are, although Pherecydes may not have been aware of this fact, “spatial concepts”, or more precisely “pre-existent space(s)” (*ibid.*), or “spatial principles necessary for creation” (p. 26) albeit represented metaphorically, and in

century thinker, and indeed, Schibli all but admits these ideas are to be found in Pherecydes only implicitly. Nevertheless, in the figure of Chronos who “steps out of eternity to create”, Schibli finds a foreshadowing of Plato's distinction between time and eternity in the *Timaeus*.<sup>89</sup>

### 3. Pherecydes and the Orphics

Scholars have long called attention to similarities between the cosmogonies of Pherecydes and that of the Orphics.<sup>90</sup> These *rapprochements* went somewhat into abeyance, however, when, in the wake of the hypercritical work of Wilamowitz and

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this sense they can be compared with the *khôra* of Plato's *Timaeus* 49a (p. 25 n. 28). Similarly, Chronos, as the personification of time, exists prior to the creation of the universe only as a “time-principle” (p. 28 n. 38). Cf. Plutarch's interpretation (*Platonic questions* 8, Mor. 1007c) of *Timaeus* 38b: prior to the creation of the heavens, there was no time, “but an indefinite motion, like a shapeless, formless matter of time”. Yet Pherecydes' proto-time, according to Schibli, like pre-cosmic space, does not become “actual, measured time” until the creation of the cosmos (*ibid*). But the creation of the cosmos, at least in its first stage, is identical with the creation of the *mukhoi*, so that time and space are “actualized” together (p. 29). Confusingly, Schibli adds in the very next sentence that Chthonie becomes “the actual earth” when she is invested with the robe. According to Schibli's own schema (p. 16), however, the creation/actualization of the *mukhoi* constitute the “first creation”, while Zas' bestowal of the robe upon Chthonie represents the second creation, of earth proper. Perhaps what Schibli has in mind, although he does not formulate it with sufficient clarity, is that there is a continuum of actualization and/or realization throughout Pherecydes' cosmogony, at each stage of which (Chronos' emission of the elements, their distribution into the *mukhoi*, the emergence of the second generation of gods, Zas' wedding with Chthonie, etc.) the universe becomes increasing real/actual/concrete. This would indeed seem to qualify as a plausible interpretation of Pherecydes' cosmogony.

<sup>89</sup> Writing a decade or so after Schibli, L. Bregli Pulci Doria takes for granted that Pherecydes did indeed distinguish, not merely between time and eternity, but also between a sensible and an intelligible world. This would explain Pherecydes' disconcerting habit of giving different names to his divinities: in our sources, for instance, the name Chronos appears alongside Cronos, Zas alongside Zeus, etc. The difference in names, Breglia argues, is quite intentional, and is intended to distinguished these divinities on an eternal/intelligible and a sensible/temporal level. Thus, it is when Chronos carries out his act of generation, thereby becoming “full time” (p. 182), that he comes to be known as Cronos. Granger (2007, 147) draws a parallel here with the Orphics, who also do not hesitate to speak of divinities changing their names (OF 145; 168-9).

<sup>90</sup> Gruppe 1851, 23ff.; Diels 1897; Zeller-Mondolfo 1932, 186ff.; West 1971; 1983; and Schibli *passim*. The essential testimonies on the Orphic demiurge were discussed by G. Wobbermin 1896, 73ff. Diels assumed that Pherecydes had been influenced by the Orphics, as does, for instance, Breglia 2000, 193. Yet Schibli (35ff.) has mustered a number of arguments in favor of the view that the influence ran in the other direction: it would have been Pherecydes, elaborating upon Near Eastern cosmogonies, who exercised a determinate influence on the Orphics.

Linforth, it became fashionable to doubt the antiquity and even the existence of most central Orphic doctrines. Today, however, although a few diehards continue to maintain that most of these doctrines are late Neoplatonic interpretations and interpolations, this position has become a good deal harder to defend since the discovery of the Derveni papyrus, which shows that an Orphic cosmogony quite similar to that found in the *Rhapsodies* was already in existence in the late fifth century BCE. The scholarly *communis opinio* – again, with some notable exceptions – thus appears to have come full circle and to have returned to what it was when Diels wrote in 1897: people calling themselves Orphics did indeed exist in Archaic Greece, they were roughly contemporaries of Pherecydes, and they maintained cosmogonic doctrines quite comparable to his in several respects.

The most striking of these similarities is no doubt the role of the hypostasized time-god Chronos.<sup>91</sup> In Pherecydes, this eternal divinity produces the three elements fire, air and water by parthenogenesis, thus beginning a two-stage process of creation that will be completed when Zeus weaves a robe depicting the inhabitable earth and grants it to Chthonie as a wedding-gift, thereby transforming her into Gê. In the Orphic *Rhapsodies*, which may date from Hellenistic times (1st century CE ?) in their present form, but contain many ancient motifs, ageless Chronos produces Aether and Chaos, then forms a great white egg in the Aether, from which leaps forth the enigmatic being known by a variety of names: Phanes, Protogonos, Erikepaios, Eros, and Metis. We recall that Eros also played a role in the cosmogony of Pherecydes, although the lacunary state of our sources makes it hard to specify exactly what that role may have been.

Finally, I would like to return to a similarity that most modern commentators have passed over in silence. We have seen that in Pherecydes, Zeus' creation of the inhabitable world is symbolized by his wedding gift to Chthonie of a robe on which he has embroidered the earth, the ocean, and the palaces of ocean. But the Orphic tradition knows a similar theme. In a myth that may have appeared in a lost Orphic work entitled *Peplos*, Persephone is depicted as weaving at her loom when she is interrupted and carried off by Hades, leaving her work unfinished. According to some late sources,<sup>92</sup> her weaving, like that of Zas, depicted the inhabitable world as well as the birds, beasts and fish that dwell upon it. In Neoplatonic exegesis, the fact that Persephone was forced to leave her work unfinished became an explanation for the existence of evil in the sensible world.<sup>93</sup>

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<sup>91</sup> There is no reason to believe, of course, that Pherecydes' Chronos assumed the bizarre appearance of Chronos in the *Orphic Rhapsodies*, with his wings, two sets of sexual organs, and heads of a lion, ram, bull, and snake, or, in the theology of Hieronymus and Hellanicos, the heads of a man, a bull, and a lion; cf. Brisson 1985, 39; 41.

<sup>92</sup> Claudianus, *De raptu Persephonaë* I, 246 ff.; Proclus, *In Tim.* 41b-c, vol. III, p. 223 Diehl.

<sup>93</sup> See the texts collected by Kern as *OF* 192 = fr. 286 Bernabé. See also Eisler 1910, 1, 247-

#### 4. Conclusion: does Pherecydes' demiurgic Chronos foreshadow the Demiurge of Plato's *Timaeus*?

What, then, of our original subject, in which we sought to determine the extent to which Pherecydes' cosmogony might be considered a predecessor of that set forth in Plato's *Timaeus*?

I believe the parallels are quite striking, although the differences are also considerable. In Pherecydes, we have a trio of eternal deities, one of whom, Chronos, creates three of the elements, apparently *a se*, if not *ex nihilo*. It is not clear how these elements are distributed into the five (or seven) *mukhoi*, nor precisely what these *mukhoi* are, nor exactly how they give rise to a second generation of gods. All we can be reasonably sure of is that a second creation then seems to occur, as the eternal but amorphous Earth is rendered inhabitable and inhabited by the life-creating demiurgy of the weaving Zas.

In Plato, by contrast, a single, apparently immortal divinity creates the world while following an eternal intelligible model: the world of Forms or Ideas. This creation does not occur *ex nihilo*, but the Demiurge limits himself to setting in order a pre-existent kind of proto-space (*khôra*), nursemaid (*tithênê*) or receptacle, which is moving in a disorderly way, agitated by the traces of proto-elements.<sup>94</sup> He thus creates the soul and body of the universe, using a *kratêr* or mixing-bowl for the former: we may recall, at this juncture, that one of the alternative titles of Pherecydes' work was *Theokrasia*, or mixing of the gods.<sup>95</sup> Finally, when the Demiurge sets about the creation of living beings (41aff.), he delegates the task to a second generation of created gods; here we are inevitably reminded of Pherecydes, where a similar generation of created gods is generated, in ways that are by no means clear, from the elements emitted by Chronos.

Finally, we noted above that Zas' weaving of a *pharos* depicting the inhabitable earth seems to have close parallel in Orphic traditions of Persephone weaving a similarly-decorated *peplos*. Are there traces of such a conception in Plato? Perhaps: at any rate, later commentators<sup>96</sup> liked to refer to the Demiurge's construction of the World soul by means of mathematical proportions and musical intervals as a "weaving", and this tradition may be reflected in certain Islamic sources,<sup>97</sup> who ascribe to Plato the invention of the art of "brocade" (Arabic *al-dibāj*).

248; Bernabé 2003, 178-180; West 1983, 9ff., 97, 245f.

<sup>94</sup> Sturz, writing in 1845, was probably thinking of this passage from the *Timaeus* (as well as of Gen. 1:10) when he interpreted Zas' wedding gift to Chthonie/Ge as a motion by which *Chaos*, previously confused, was brought into order. Cf. Schibli 1990, 42 n. 84.

<sup>95</sup> Schibli 1990, p. 20 n. 15.

<sup>96</sup> Particularly Macrobius. Cf. *Commentary on Scipio's dream*, II, 3, 15: ad imaginem *contextionis* animae.

<sup>97</sup> Notably the anonymous *Book of the Secret of Secrets* (*Sirr al-asrār*), book II, p. 85 Badawi. Cf. Ibn Abī Uṣaybi'a, *ʿUyūn al-anbāʾ fī ṭabaqāt al-aṭibbaʾ* (*Sources and information on the generations of physicians*), vol. I, p. 43 Müller. These texts are the subject of M. Chase, in press.

To sum up, many features of Plato's Demiurge have significant parallels both in Orphic traditions of Chronos and in the scant remains of Pherecydes' lost work, which seems, perhaps for the first time in Greek philosophy,<sup>98</sup> to portray a demiurgic Zeus who creates the world as an artefact. Yet while the former kind of parallels have been extensively studied, the parallels between Pherecydes' demiurgic Zeus and the demiurge of Plato's *Timaeus* have not.<sup>99</sup> I believe an in-depth study of these parallels might be worthwhile.

Now that we have seen something of Pherecydes' ideas concerning the creation of the cosmos, let's fast forward 2500 years or so and see to what extent they may, or may not, have been on the right track.

Clearly, no one in his right mind is going to claim today that there was a divinity named Chronos who produced the elements of which the world is made up by ejaculation, whereas another divinity then changed the earth into an inhabitable place by weaving a robe for it on which the world was depicted. Then again, chances are that Pherecydes didn't mean his mythical accounts to be taken literally either. They were, in all likelihood, intended, not as allegories but as symbols.<sup>100</sup>

If that's the case, what elements in Pherecydes' thought in particular, and ancient speculation in general, might present analogies with current cosmological theories?

We've seen that the paradigm of weaving was important for Pherecydes, Plato, and his commentators as a way of making comprehensible the origin of the world we live in. Perhaps it's just a coincidence that one of Brian Greene's works, in which he popularizes the conclusions of string theory, is entitled the *Fabric of the Cosmos*.<sup>101</sup> One of the reasons for this title is Einstein's discovery of a four-dimensional space-time that has elastic properties. Breaking with Newton, who thought of gravity as a force acting instantaneously between two massive objects, Einstein thought of the fabric of space-time as a kind of stretchable surface that can be bent and curved by massive objects, as if one placed a bowling ball on a rubber sheet.<sup>102</sup> Greene is also alluding to the nature of string theory itself, according to which the many kinds of particles known to contemporary physics, instead of being point-like, are in fact tiny strings of non-zero length, whose apparently different properties are due to the way they vibrate.

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<sup>98</sup> Schibli 1990, 54ff.

<sup>99</sup> It is highly likely that Plato was familiar with Pherecydes' work. Plato's suggestion (*Timaeus* 55d) that there might be five *kosmoi* certainly looks like a definite allusion to Pherecydes' *pentemukhos kosmos*; cf. Schibli 1990, 22 & n. 18.

<sup>100</sup> I assume, with Henry Corbin, that an allegory describes a state of affairs that could be described otherwise, i.e. literally, while a symbol could not be stated in more explicit terms.

<sup>101</sup> 2004. See also David Deutsch, *The Fabric of Reality*, New York: Penguin, 1997.

<sup>102</sup> According to Bojowald 2010, 32, the equations of relativity “visualize space-time as a curved and wrinkled sheet, albeit in four dimensions”. Cf. Frank 2011, 137: “in Einstein's theory, as elaborated by Minkowski, the whole of creation was nothing more than a web of events situated in space and time”, “...Mass-energy caused the distortions of space-time's fabric” (ibid. 141).

But it's no doubt in loop quantum gravity, a theory that envisages an atomic structure of space and time and an eternal alternation between phases of expansion and contraction of the universe, that the metaphor of weaving plays the most important role. According to the cosmologist Martin Bojowald<sup>103</sup>:

everything – space, time, and matter – is a fluctuating discrete mesh whose internal relations are what we perceive as change (...) This picture is entirely different from that usually referred to in general relativity: the fabric of space is not made of rubber, but woven from threads. One can view the space of loop quantum gravity as some kind of woven structure.

Pherecydes' vision of the woven fabric of the universe may thus have been on the right track, although it would take prolonged studies by more qualified scientists than I to confirm this suggestion.

## APPENDIX: DARK MATTER AND DARK ENERGY

### 1. Dark matter

In 1933, Fritz Zwicky had suggested that the speed with which distant galaxy clusters rotated seems to imply the presence of much more matter than was contained in the stars. In the 1950s, the American astronomer Vera Rubin took up Zwicky's idea, determining the velocity of galaxies or groups of galaxies by the frequency of light emitted by hydrogen atoms. She hypothesized that clusters of galaxies might be rotating around a central point, which would have to contain an enormous quantity of mass, greater than the mass of all the stars in the galaxy in question. This led her to propose, in her master's thesis, that some kind of invisible matter was also present in large quantities. It took thirty years for Rubin's conclusions to be verified and accepted by most astrophysicists, but this had occurred by the 1980s, and the existence of dark matter became a scientific commonplace.

What precisely that dark matter might be is quite another question. It's been proposed that it may consist of MACHOS (massive compact halo objects); that is, mainly dead stars such as white dwarfs, brown dwarfs, neutron stars, and black holes. Yet calculations of the presence in the universe of such light elements as hydrogen, lithium, helium and deuterium show that the amount of matter in the universe that consists in protons and neutrons must be much less than the amount of dark matter, which cannot consist in protons, neutrons, atoms, or molecules.

The next suggestion was that dark matter may be made up of neutrinos, a particle postulated by Wolfgang Pauli and confirmed experimentally by Enrico Fermi in 1934. The various types of neutrinos discovered are examples of WIMPS (weakly interacting massive particles), but they are what's known as hot dark matter – they move at speeds close to that of light – and so could not have led to the galaxy formation we witness in our universe.<sup>104</sup>

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<sup>103</sup> Bojowald 2010, 85; 96-97.

<sup>104</sup> On cold vs. hot dark matter, cf. Panek 2011 189ff.; Hooper 2006, 77ff.

Finally, according to a theory known as supersymmetry, there are seven candidates for the role of dark matter: these include three sneutrinos (supersymmetric partners of the three kinds of neutrino), as well as the supersymmetric partners of the photon (called the photino), the Z boson (called the zino), and the two kinds of Higgs boson (called Higgsinos). These latter four together are known as the neutralinos. The lightest of these neutralinos is the current favourite candidate for the role of dark matter.

Of the many other candidates for the existence of dark matter, perhaps the most interesting has been provided by string theory. This theory, which first emerged in the 1960s and has undergone many revisions and metamorphoses since then, predicts, among other things, that instead of the three or four dimensions of which we are aware, there are many more dimensions – between 10 and 26 – most of which are too small for us to see. If there were particles travelling in these extra dimensions, they would appear to us to be slow-moving and extremely massive. It's been suggested that such particles, known as Kaluza-Klein states, may be responsible for dark matter.

## 2. Dark energy

Dark energy, the mysterious force responsible for the acceleration of the expansion of our universe, has often been considered as equivalent to Einstein's cosmological constant. But perhaps a more interesting way to envisage it is as the power or density of empty space, which physicists refer to as vacuum energy or zero-point energy. Its effect is the opposite of that of gravity: it pushes matter apart, and its density always remains fixed, no matter how much the universe may be diluted by its expansion. This means that at the beginning of the universe, when the density of matter was huge, the relative quantity of dark energy was insignificant. As the relative density of matter became diluted by the Universe's rapid expansion, however, the quantity of dark energy became more important, eventually overcoming the force of gravity. When this occurred seven to five billion years ago – and here again we appear to have something akin to a phase transition<sup>105</sup> – the rate of the universe's expansion began to accelerate, and we are still in the midst of this period of acceleration today.

An alternative to the interpretation of dark matter as a cosmological constant is that it may be not constant, but a quintessence<sup>106</sup> or dynamic dark energy, whose effect varies over time. The particle responsible for it would have begun to act when matter achieved dominance over radiation in the early history of the universe.

### III. FROM THE CHURCH FATHERS TO ISLAM

In my last talk, I corrected some of what I said last year, when I claimed that the debate over whether the world is eternal or created originated in Plato and Aristotle.

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<sup>105</sup> Panek (2011, 180) refers to this transition as the universe's "turning over".

<sup>106</sup> On quintessence cf. Hooper 2006, 178f.; Panek 2011, 208f.

We have now seen that at least in Pherecydes of Syros and the Orphics, and quite possibly in other Presocratics, what has often been seen as a Platonic innovation – the notion of the world as created by a Demiurge – may go back to at least the sixth century BCE. These sixth-century thinkers, in turn, may well have been inspired by Oriental myths that were very ancient indeed.

Not all of what I said last year was false, however. We did see that Aristotelian doctrines of motion and change played a key role in ancient discussions of whether the world is eternal or created. This, as we saw, could be described as a case in which a Christian thinker tried to use the weapons of Greek philosophical thought – in this case, those of Aristotelian natural philosophy – to defeat some key tenets of Greek philosophy itself, such as the eternity of the world. Another Christian approach to this issue was, however, equally possible. It started out more from Plato than from Aristotle, and the solution it arrived at was rather theological than strictly philosophical.

In this part of my contribution, then, we'll begin by studying how pagans and especially Christians responded to Plato's explanation in the *Timaeus* of why the Demiurge created the world, before moving on to a brief discussion on the way this problem was taken up in the world of Arabo-Islamic philosophy.

### 1. Plato on why God creates

As we saw last year, in the *Timaeus* (29e1-30a2), Plato gives a brief account of why the Demiurge undertakes the creation of the world. Basically, Plato's explanation could not be simpler: The Demiurge is good, and what is good desires to share that goodness with others.<sup>107</sup>

As often in the history of Western philosophy, however, the simplest of propositions may conceal wide-ranging implications. In the course of the Late Classical and Hellenistic periods, philosophers pored over every word of Plato's writings, trying to tease out their deepest meaning. In this particular case, as they reflected on Plato's axiom, they came up with some rather troubling questions: if the Demiurge creates because he is good, does it follow that his essence or his being *consists* in his goodness? If so, then does his goodness *consist* in his creativity? If this is the case, however, what is the Demiurge's moral and ontological status when he is not creating the world? What was he doing *before* then? Was he idle? If so, wasn't he behaving in a manner contrary to his essence? But how could God be God without being good, i.e. without creating the world?

To make a very long story very short, most Platonists concluded that God's creative activity is necessary and eternal (cf. **Text A**): if God must create in order to fully realize His essence, then there can never be a time when he does not create (**Text C; D**).

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<sup>107</sup> Cf. Plotinus, *Ennead* II 9, 3, 7ff.: “Each must give of what it has to something else, or else the Good will not be Good”; Porphyry ap. Procl., *In Tim.*, I, 368, 15 ff.: the demiurge's goodness (*agathotês*) is the main principle (*kuriôtatê arkhê*) for the world's existence; cf. Baltes 1976, 145 n. 233. Hierocles of Alexandria also held that the Demiurge's only motives for creation are his will and his goodness (*De prov.*, in Photius, *Library* 214.4; *In carm. aur.* I, 13).

When it comes to the question of the origin of the world, these considerations seem to rule out the possibility that the world was created at a specific moment in time, since it is hard to accept the notion that God was ever idle prior to that moment. Creation must be a continuous process, precisely because God must always create.

Some of these conclusions were bound to come into conflict with emerging Christian orthodoxy. According to Biblical tradition, God's creation of the world was a one-shot affair: it took place just once and it did so within time. Equally importantly, for this tradition the Creation was the result of a freely willed act on God's part, but if God creates necessarily and automatically, like a body gives rise to its shadow (**Text D**), then there seems to be no room left for God's creative will. On the Neoplatonic account of things, God seems to have no choice but to create, or as the Scholastics would put it later, he lacks *libertas contradictionis vel exercitii*. Some Christians also argued that the automatic nature of creation ruled out divine providence. If God creates the world like a body casts a shadow, then why should He care about the world's destiny? Who has ever wanted to adorn or purify his shadow?<sup>108</sup>

Many Christians nevertheless remained convinced that Plato's axiom was fundamentally true,<sup>109</sup> even though this belief sometimes led them to what the Church defined as heresy. The great church father Origen (c. 184-253 CE), for instance, concluded that since God's goodness can never be inactive, his creative activity must be without beginning or end (**Text E**).<sup>110</sup> Thus God the Father eternally generates the Son<sup>111</sup>; but he also eternally creates rational beings,<sup>112</sup> as well as an infinite number of worlds, one after the other.<sup>113</sup> The creation is thus co-perpetual (*sunaidios*) with God.

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<sup>108</sup> Aeneas of Gaza, *Theophrastus*, cited by Wacht 1969, 81.

<sup>109</sup> Augustine, for instance, wrote that as far as the reason for the existence of the world is concerned, "there is no better cause than that the good should be created by a good God. Plato, too, says this is most just cause for establishing the world: that good works should come from a good God" (*civ. Dei* XI, 21). Cf. Origen., *De princ.* II, 9, 6, p. 169, 24ff. Koetschau: Hic cum "in principio crearet" ea, quae creare voluit, id est rationabiles naturas, nullam habuit aliam creandi causam nisi se ipsum, id est bonitatem suam.

<sup>110</sup> Cf. Origen, *De princ.*, I, 2, 10, p. 42, 12f. Koetschau: *Ei de ouk estin hote pantokratôr ouk ên, aei einai dei tauta, di' ha pantokratôr esti.*

<sup>111</sup> Cf. Origen, *De princ.*, I, 2, 4, p. 33, 1 f. Koetschau, who speaks of the generation of Son from the Father as *aeterna generatio sicut splendor generatur ex luce*. Compare, with Theiler 1966, p. 99, Plotinus V 1, 6, 28 on the Intellect as eternally engendered (*aei gennômenon*) by the supra-essential Father, like sunlight from the sun.

<sup>112</sup> Origen, *De princ.*, I, 2, 10; I, 4, 3 K.; *In Jeremiah*, Homily 9, p. 70, 20ff. Klostermann.

<sup>113</sup> Unlike in the Stoic theory, these worlds are not identical; cf. Origen, *De princ.*, 119, 6ff. K.; *c. Cels* 5, 21, p. 22, 28; 4, 67, p. 337, 6ff. In the new world, all differences between rational beings cease to exist, so that, as Jerome sarcastically says (*Letter 84*, p. 129, 4): "After many ages and the one restitution of all things, Gabriel will be identical to the devil, Paul to Caiphas, and virgins to prostitutes".

These views left Origen open to a number of accusations<sup>114</sup> which eventually resulted in his being condemned as a heretic (as was John Philoponus).<sup>115</sup> Origen was accused of having made God dependent on his own creation, and of having made Christ the Son, identified with Sophia or the divine wisdom in which the Platonic Forms or Ideas are recapitulated,<sup>116</sup> subordinate to God the Father.<sup>117</sup> To make Christ the Son subordinate to God the Father was, of course, the heresy of Arianism, and last year we saw Simplicius making the same reproach to Philoponus, when the latter claimed that everything after the First, presumably including Christ the Son, is created.<sup>118</sup>

Other Church Fathers<sup>119</sup> found other answers to Plato's requirement – or rather, the doctrine deduced from Plato – that God's creative activity must be unceasing, by maintaining that the world was already present in God's mind prior to its creation, so that God was never inactive. Zacharias of Mytilene (PG 85, 1088), for instance, solved the problem by claiming that prior to the creation of the world, God was busy creating angels. Aeneas of Gaza, for his part, restricts God's eternal creativity to inner-Trinitarian processes (production of the persons of the Trinity, creation of spiritual beings).

When Christian orthodoxy came to be codified – first at the first Council of Nicaea in 325, and then, with increasing rigor, in the doctrines of Athanasius – the Platonic principle was enshrined that God is always and naturally good, and is therefore always generative.<sup>120</sup> There was no time, it was decreed, when God did not generate the Son, second person of the Holy Trinity.<sup>121</sup> God created the world, which previously did not exist, out of nothing by a unique act of His will. Athanasius thus agreed with the Platonists that God always had to be creative, yet he came up with an ingenious distinction between two kinds of divine creativity. God's production of the Son was a *gennêma*,<sup>122</sup> which took place eternally and by nature (*phusei*), not by will.<sup>123</sup>

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<sup>114</sup> As early as 310 CE, Origen's student Pamphilus, the teacher of Eusebius, combined a list of nine accusations raised against Origen, many of them mutually contradictory. Cf. PG 17, 578-579.

<sup>115</sup> Origen was condemned at the Second Council of Constantinople, in 553.

<sup>116</sup> Cf. Origen, *De princ.*, p. 30, 7; 36, 5 Koetschau. Augustine holds the same view.

<sup>117</sup> Cf. Origen, *Contra Cels.*, V, 39, p. 43, 16ff. Koetschau: Χριστιανοί (...) τιμᾶν ὡς ὑπὸ τοῦ θεοῦ γεγενημένην καὶ οὐσαν υἱὸν θεοῦ (...) Κἂν δεῦτερον οὖν λέγωμεν θεόν etc. Origen can therefore refer to Christ as a *ktisma* or *dêmiourgêma*, cf. *c. Cels* 5, 37; *De princ.*, 4, 4, 1; *In Joh. I*, 20. The Arians also considered Christ to be a *ktisma*; cf. Athanasius, *c. Ar.* II, 28.

<sup>118</sup> Chase 2011, 126 f.

<sup>119</sup> Methodius; Gregory of Nazianzen, *Carm.* 1, 4, 55ff.; Eznik of Kolb *Against Erroneous Teachings* 3, 17; Zacharias of Mytilene, PG 85, 1068B; 1096C.

<sup>120</sup> Athanasius, *De inc. verbi*, ch. 3 (with citation of Plato's *Timaeus* 29e); C.G. 41, *De Inc.* 42.

<sup>121</sup> Athanasius, *c. Ar.* 3, 66, PG 26, 464B: *hōsper agathos aei kai tēi phusei, houtōs aei gennêtikos tēi phusei ho patēr*. Athanasius inherits this concept from Origen; cf. Simonetti 1975, 271, n. 52.

<sup>122</sup> Athanasius, *c. Ar.* 1, 16.

<sup>123</sup> According to Athanasius, admitting that the Son was generated by the Father's will is

His production of the world, in contrast, was a *poiëma*, which took place in time, out of nothing (*ex ouk ontôn = ex nihilo*), and was the result of an act of will (*ek boulêseôs*).<sup>124</sup> The Athanasian distinction between *poiëma* and *gennëma* can be summed up as follows (**Table 5**).

As a result of this doctrine, Athanasius was able to show, against the Platonists, that the existence of the world is contingent rather than necessary, and that it can therefore have a temporal beginning-point of its existence. Although God cannot be said to be a father in the absence of his Son, he can perfectly well be said to be Creator (*poiëtês*) even before the world was created. If a captious interlocutor were to ask Athanasius why God, who is capable of always creating, does not always do so, he can answer that the impossibility of eternal creation depends not on God but on his Creation. By definition, created things come from nothing and did not exist before they came into being; therefore, they cannot be eternal. Such things cannot, therefore, always co-exist with God, who is eternal in the full sense of the term.

My choice of mentioning Origen is not accidental. We recall, I hope, from last year that we were able to trace back some of the doctrines John Philoponus used when combatting Proclus' arguments in favor of the eternity of world to the works of Plotinus' student, the Neoplatonist philosopher Porphyry of Tyre. Thus, it seems to have been Porphyry who first argued for the instantaneous nature of the creation of the world, claiming it's analogous to the snapping of one's fingers or the appearance of a flash of lightning. According to Porphyry, God brings the universe into existence just by thinking it, and simultaneously with his thought (*hama noëmati*). What's more, Porphyry, building on the doctrine of the Chaldaean Oracles, seems to have taught that god created matter,<sup>125</sup> so that we can quite legitimately cite him as a defender of the doctrine of creation *ex nihilo*.<sup>126</sup>

Now Porphyry (ca. 235-c. 310 CE) was, of course, a student of Plotinus (c. 204-270) who in turn was a student of a mysterious figure named Ammonius Saccas. According to some sources, including Porphyry, the Church Father Origen (c. 185-251)

equivalent to saying that there was a time when the Son did not exist (c. *Ar.* 3, 59, PG 26, 448A; 3, 66, 464A-B, cf. *Ep. ad ep. Aeg. et Lib.* 12, PG 25, 55). To say that the Son comes into being through God's will amounts to saying that the Son is also a creature.

<sup>124</sup> Athanas. c. *Ar.* 2, 24: *monon êthelêke, kai hupestê ta panta*; 3, 64: *ta poiëmata boulêsei (...) hupestê*. Cf. Augustine, who speaks (c. *Fel.* 2, 18), of *quod de se deus genuit* (Logos) - *quod fecit non de se, sed ex nihilo* (viz., the world). For Athanasius (c. *Ar.* 3, 59, 26, 449C), to identify *gennëma* and *poiëma*, as did the Arian Asterius, is the greatest of impieties.

<sup>125</sup> Cf. Aeneas of Gaza, *Theophrastus*, p. 45, 4ff., Colonna, 51 Boissonade, quoted by I. Hadot 2004, p. 18 n. 55: "Matter is thus neither unengendered nor without a beginning; this is what the *Chaldaean Oracles* and Porphyry teach you. He entitles «On the Descent of the Soul» the book which makes public the *Chaldaean Oracles*, in which the fact that matter is engendered is strongly defended, and while interpreting Plotinus' book entitled «On the origin of evils», he says somewhere that matter is not unengendered, and that the affirmation according to which it must be counted among the principles must be rejected as atheistic".

<sup>126</sup> Cf., however, the qualifications set forth by I. Hadot 2004, 23.

was also a student of Ammonius, whom Porphyry claims was originally a Christian who later converted to Christianity. If this is so – and there is a tremendous amount of controversy on this point – then it's not impossible that both Origen and Porphyry are reflecting the teachings of Ammonius when they maintain such doctrines as that of continuous creation. According to Willy Theiler, at any rate, Ammonius already taught the doctrine of continuous creation, including matter, by the Demiurge, and he backs up this view with evidence like our Text F, taken from Hierocles of Alexandria, who quoted Ammonius. Theiler goes so far as to suggest that where Porphyry differs from his master Plotinus, he is often returning, as a reaction against Plotinus' innovations, to the views of Ammonius, for whom the highest principle seems to have been not the One,<sup>127</sup> as in Plotinus' metaphysics, but the Demiurgic Intellect, as it was in Middle Platonism.<sup>128</sup> This, in turn, might help to explain the fact, which scholars have often noted, that several aspects of Porphyry's thought seem more akin to Middle Platonism than to Neoplatonism.

## 2. Proclus and the *Plotiniana Arabica*

In this second part of my presentation, I'll continue the discussion of the way the debate over whether the world is created or eternal was transmitted from Greek to Arabic sources. Here, I'll be concentrating on the relationship between the Neoplatonic philosopher Proclus (c. 412-485 CE) and a group of Arabic philosophical writings probably composed in the first half of the ninth century CE, and known collectively as the *Plotiniana Arabica*.

The group of texts known as the *Plotiniana Arabica* includes the so-called *Theology of Aristotle*,<sup>129</sup> the *Sayings of the Greek Sage*,<sup>130</sup> and the *Treatise on Divine Science*, all of which consist primarily in translated extracts from books IV-VI of the *Enneads* of Plotinus. Another group, which I won't have time to discuss here, is represented by the *Book of the Pure Good* or *Book of Causes*,<sup>131</sup> a work put together from adaptations of several propositions from Proclus' *Elements of Theology*. The *Plotiniana Arabica*, which “completed” Aristotelian metaphysics by ascribing to the Stagirite a

<sup>127</sup> This point too is controversial; denied by Saffrey and Schwyzer, it is affirmed by Weber and Baltes; cf. Schibli 2002, 52 n. 39.

<sup>128</sup> And as it was for Origen the Christian, who denied the existence of any God higher than the world-creator (*De princ.*, 4, 2,1, p. 308, 5 Koetschau). Cf. Weber 1962, 106. Hierocles, although he often speaks of the Demiurge as the highest principle in the two partially preserved works that have come down to us, in fact knows several principles higher than the Demiurge; cf. Hadot 1979; 2004.

<sup>129</sup> *Uthūlūjjiyā wa-huwa qawl 'alā-l-rubūbiyya*. The manuscripts indicate the work is the result of a commentary by Porphyry, and was translated by 'Abd al-Masiḥ ibn Nā'ima of Ḥims; scholars tend to dismiss the former assertion (rightly or wrongly) and accept the latter. The guiding force behind this translation activity, which also included authentic works of Aristotle and Alexander, was the great Islamic philosopher al-Kindī (ca. 801-873).

<sup>130</sup> *al-Ṣayḥ al-Yūnānī*.

<sup>131</sup> *Kitāb (al-Īdāh) fī Maḥd al-ḥair*.

Neoplatonist-style system of emanation, were influential – tremendously so – on the development of Islamic thought, but their main component, the *Theology of Aristotle*, was not translated into Latin until the 16th century.<sup>132</sup> The *Book of the Pure Good*, by contrast, translated into Latin as the *Liber de Causis*, came to be very important for Latin Scholasticism. It was commented upon, for instance, by Albertus Magnus and his student Thomas Aquinas, and I think it could be shown that the interpretation of Aristotle proposed by Thomas, and maintained to this day by many Thomistic philosophers, is unimaginable and incomprehensible unless one takes into account the influence of the *Liber de Causis*.<sup>133</sup>

It was a moment of tremendous importance in the study of Islamic philosophy when, in 1973, Gerhard Endress published his *Proclus Arabus*. This book was devoted to a study of the Arabic translation, probably carried out in the first part of the ninth century,<sup>134</sup> of 22 propositions<sup>135</sup> from the *Elements of Theology* by the fifth-century Neoplatonist Proclus, although the manuscript that preserves them announces that it contains “What Alexander of Aphrodisias has excerpted from Aristotle's book ‘Theology’, i.e. *On the Divinity*”.

Without further ado, I'd like to draw your attention to one of these propositions, Proclus' *Elements of Theology*, proposition 76 (our **Text H**). The two left-hand columns give E. R. Dodds' Greek text with his English translation (which I've slightly modified), while the two on the right give a transliteration of Endress' Arabic text, together with my English translation.

Proclus' original Greek text is relatively straightforward: Things that come into being or are generated from an unmoved cause are unchanging, while things that derive from moved causes are changeable. He proves this by using a characteristic Neoplatonic doctrine that was to be extremely important for Arabic philosophy: unmoved causes produce their effects *autôî tôi einai*, by their very being.<sup>136</sup> It follows that their effects last as long as they do. The first cause always exists, therefore its effect also always exists. Moving causes, in contrast, produce changeable effects. This must be so, otherwise a cause would be mightier<sup>137</sup> than its effect, which goes against Neoplatonic principles.

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<sup>132</sup> 1519, to be exact; cf. Zimmermann 112 & n. 15.

<sup>133</sup> I refer mainly to the interpretation that for Aristotle, God is the Creator/efficient cause of the world. This is not the only factor, of course. In the Arabic tradition on which Thomas was partially dependent, Aristotle was already perceived through the filter of sometimes tendentious translations and works of dubious authenticity, such as Alexanders' *On the principles of the All* (*fī-l-mabādi' al-kull*). Cf. Endress 1997.

<sup>134</sup> Endress 1973, 242.

<sup>135</sup> Specifically, Propositions 1-3, 5, 15-17, 21, 54, 62, 72-74, 76, 78-80, 86, 91, and 167.

<sup>136</sup> D'Ancona (2011, 195) speaks of creation *autôî tôi einai* as an “idea tipicamente post-procliana e ‘dionusiana’”, but in fact it is already typical of the thought of Porphyry, more than a century before Proclus. See, for instance, Porphyry, *Commentary on the Timaeus*, **Text A** above.

<sup>137</sup> Literally “stronger”, “more powerful” (*kreittôn*). For the Neoplatonists, being steadfast,

We have here one of the foundational statements of the doctrine of continuous creation. Another formulation of it, also by Proclus, is part of **Text D**, which we have already studied. In this text, Proclus, like all Neoplatonists, starts out implicitly from Plato's explanation of creation in the *Timaeus* (29E): why did the Demiurge create the world? The answer, as we have seen, is that he did so because he was good, and therefore he wanted to share his goodness with other things to the greatest possible extent. Note, by the way, that Proclus' argument seems to tread a fine line between freedom and necessity on the Demiurge's part. On the one hand, mention is made of his will (*bouletai*), but on the other the Demiurge's creation, motivated by his goodness, seems to be an almost automatic process, like the sun's heating or fire's warming.<sup>138</sup> Yet Proclus here puts his finger on what was, as we have also seen, to become a sore spot for Christian and Islamic apologists: if God is always good, and creation is the natural, necessary, or inevitable activity of what is good, then surely God *must* always create. Why, as Abrahamic Scripture claims, would he set about doing so one fine day in history, say, six thousand years ago?<sup>139</sup> What was He doing before then? Was He idle? If so, wasn't he behaving in a manner contrary to His essence? But how could God be God without being good, i.e. without creating the world?

Returning to the Arabic version of Proposition 76, we find that the opening statement of the proposition is a faithful Arabic translation of the Greek. Before we come to Proclus' proof, however, the Arabic interpolates a passage that has nothing corresponding to it in the Greek. Nor is one likely to find anything corresponding to this interpolation in any pagan Greek text with the possible exception of Porphyry – because it introduces nothing other than the doctrine of *creatio ex nihilo*, which seems to contradict the fundamental principle of Greek thought that nothing comes from nothing. According to the interpolator, what is created from or by the Highest Cause – that is, God – is generated without change in anything prior to it: in other

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immobile and unchanging was a sign of power.

<sup>138</sup> Cf. *Theology of Aristotle* 8.143 (275) = p. 112 Dieterici (translation Zimmermann 237-8 n. 346): “The cause of time is not under time; no, it exists in a higher and loftier manner, like the relation between the shadow and the object casting a shadow” (*wa-‘illa al-zamān lā takūn taḥta al-zamān, bal takūn bi-naw‘in a‘lā wa-arfa‘ ka-naḥw al-ḡill min ḡī al-ḡill*). On this text, which the editor/translator has interpolated in his version of Plotinus, *Ennead* V 1, 6, 20, see D’Ancona 2011, 158 & n. 48. The image of creation as similar to the casting of a shadow may go back to Porphyry; cf. Sallustius, *De diis et mundo* 7, 2; Aeneas of Gaza, *Theophrastus*, p. 52 Boissonade; Zacharias of Mytilene, *Ammonius*, p. 105 Boissonade; Philoponus, *De aet. mundi* 14, 28 Rabe. Cf. Theiler 1966, 178f.; Wacht 1969, 73f. Interestingly, according to Aeneas the Platonists deny that the body's production of its shadow is a case of making or creation (*ou pepoiēken*): instead, the shadow is consequent upon the body (*all’ ekeinē toutōi sunēkolouthēsen*).

<sup>139</sup> This was basically already Aristotle's (*Phys.* 8.1) reproach to Anaxagoras, who believed in the periodic formation of worlds. As Ross comments (*Aristotle's Physics*, Oxford 1936, 689), “Anaxagoras merely introduces motion at one particular point of the world's history without suggesting why it should have begun then rather than sooner or later”.

words, God does not change when He creates. Instead, such things come into being from nothing (*min lā šay'*). In contrast, things that come into being from the secondary cause, otherwise known as Nature, do not come from nothing, but from a change in something preceding them; in other words, in a pre-existent substrate.

In short, the doctrine contained in our interpolated passage can, I think, be resumed as follows. When God creates, He does so *ex nihilo*.<sup>140</sup> When Nature creates, she does so from something pre-existent, in other words, from a substrate.

The brief text of this interpolation in the Arabic translation of one of the propositions of Proclus' *Elements of Theology* seems to me symptomatic of several of the key features of the way Greek Neoplatonic texts were taken up and adapted in Arabo-Islamic philosophy and theology. First there is the question of pseudonymy: the manuscript presents the author of this text not as Proclus, the pagan Neoplatonist who wrote books arguing for the eternity of the world, but as Alexander of Aphrodisias, the greatest and most orthodox exegete of the greatest of the Greek philosophers, Aristotle, whom the Arabs knew, at least since the time of Avicenna, as "the First Teacher" (*al-mu'allim al-awwal*). It was precisely this process of pseudonymous attribution that led to the constitution and adoption of several Arabic texts that were profoundly important, not only for Islamic philosophy and theology but also for the Medieval West: foremost among these were the aforementioned *Plotiniana Arabica* and the *Liber de Causis*.

The second significant element is, of course, the philosophical doctrine of our interpolated passage. What could have led our translator to insert the doctrine of *creatio ex nihilo*, so far from the beliefs of the historical Proclus, but also foreign to the genuine views of both Aristotle and Alexander – into a translation/adaptation of a proposition from Proclus' *Elements of Theology*?

The answer can be found, I think, in some of the texts we looked at last year. As we saw, Proclus had also written a work entitled *On the eternity of the world*, in which he presented a series of eighteen arguments against the Middle Platonic and Christian doctrine that the world was created in time. This work is lost in the original Greek, and preserved only by quotations made of it by the Christian Neoplatonist John Philoponus, when, around 529 AD, he set out to refute it in his *On the Eternity of the world against Proclus*. Proclus' work was, however, translated into Arabic,<sup>141</sup> as was Philoponus' refutation of it.<sup>142</sup> The fourth of Proclus' arguments, as reproduced by Philoponus, is **Text H** on your handout.

We can see right away that this argument is merely an expanded version of proposition 76 of the *Elements of Theology*, or rather an application of it to the question of

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<sup>140</sup> The doctrine of *creatio ex nihilo* (*lā min šay'*) appears in the so-called Long Version of the *Theology of Aristotle* (cf. Zimmermann 178f.; 196ff.), and plays a crucial role in the thought of al-Kindī and the Pseudo-Fārābī.

<sup>141</sup> In at least two versions, once by the great translator Ishāq ibn Ḥunain; cf. Endress 1973, 15-17.

<sup>142</sup> Endress, *loc. cit.*, 17-18.

whether the world is eternal or was created in time. Starting off from the conclusion of prop. 76 – that an unmoved cause produces unchanging effects, and does so by its very being (*autôî tôi einai*) – Proclus adds additional considerations. The Demiurge cannot change from producing the world to not producing it, since if he did he would be moved (change being a kind of motion), and the Demiurge has been supposed to be unchangeable. An unmoved cause, like the Demiurge, must therefore produce the world either always or never: Proclus does not discuss this second alternative here, but we can assume it's ruled out by the Demiurge's goodness and lack of jealousy (Plato's axiom in the *Timaeus*, as we saw earlier). Proclus now goes on to add a proof of why the Demiurge must be unmoved. He adduces two arguments: the first uses the Aristotelian and Peripatetic axiom that motion is an incomplete actuality,<sup>143</sup> in order to claim that to impute motion or change to the Demiurge is to attribute to him incompleteness or imperfection. We saw in our **Text E** that Origen also rejects this possibility. The second argument uses the unstated premise that all motion takes place in time, to argue that if the Demiurge moved or changed, he would need to do so in time. But according to Proclus' metaphysics, the Demiurge *produces* time, so he cannot require it in order to move or change. It follows, Proclus concludes, that if someone intends to honour the Demiurge by claiming, as the Christians do, that He is everlasting but the world is not, then that person is in fact dishonouring God, imputing to him change, and hence imperfection and a need for time.

Philoponus, as a Christian, is not buying Proclus' arguments. He does not deny the Aristotelian premises that all motion takes place in time, or that motion is an imperfect actuality. What he does deny, as we saw last year, is that God's creative activity can correctly be called a *motion*. According to Philoponus, God's creative activity, by which He produces all things through His will alone,<sup>144</sup> outside of time and space, cannot be a motion. Whereas all motions (Greek *kinêseis*) are activities (*energeiai*), not every activity is a motion. Indeed, Philoponus argues, there are two kinds of activity<sup>145</sup>: on the one hand, there is motion (*kinêsis*), which is a transition from initial potentiality to the acquisition of a state (Greek *hexis*). Examples might include my studying Greek, or losing weight: these processes, which have their goal outside themselves, take place in time and are necessarily imperfect or incomplete until they have achieved their goal. Once I've learned Greek, or lost weight, the re-

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<sup>143</sup> Aristotle, *Physics* 3, 1, 210a10ff.

<sup>144</sup> We saw in **Text F** that Hierocles, Proclus' contemporary, also holds that the Demiurge creates by his will alone.

<sup>145</sup> As Hasnawi has shown, this distinction is derived from Themistius (*In Phys.*, 3, 1, p. 68, 30ff. Schenkl), whom Philoponus copies out word for word in his *Commentary on the Physics* (CAG 16, p. 341, 22f. Vitelli). This commentary was translated into Arabic, and extracts from it were integrated into Işhâq ibn Ḥunain's Arabic translation of the *Physics*. Yet the ultimate source seems to have been Alexander of Aphrodisias, *Quaestio* I, 21, p. 34, 30-35, 15 Bruns, a work that was translated into Arabic under the title "On form and the fact that it is the perfection and accomplishment of motion according to Aristotle".

sult, according to Aristotelian thought, is a *hexis*, characterized by full actuality and the elimination of all potentiality. Now that I have learned Greek, when I actually read or write it – that is, when I actualize my *hexis* – this process is instantaneous: it takes place outside of time, and therefore cannot be described as a motion or a change.<sup>146</sup> As Philoponus puts it, such instantaneous “projections” (Greek *probolê*) from a *hexis* take place *en tōi nun*, that is, in the now, that indivisible instant which is not time, according to Aristotle, precisely because it is the *limit* of time.

In books 9 and 11 of his *Against Proclus on the Eternity of the World*, Philoponus came up with other arguments to prove that God's creation of the world was instantaneous, and took place *ex nihilo*. He recycled some of these arguments in another work, entitled *Against Aristotle*,<sup>147</sup> fragments of which are preserved by Simplicius in his own *Commentary on Aristotle's Physics 8 (Text J)*.

Here, Philoponus emphasizes the difference between the modes of creation of Nature and God. Nature, which requires a substrate, must produce what she produces out of things that already exist (*ex ontōn*). But this is not true of God, whose transcendence means he does not require any pre-existent material to carry out his creative activity. Indeed, if God is to be any different from nature (and Philoponus, as a Christian, clearly thinks He must), then He *must not* create in the same way Nature does. Unlike Nature, God creates not only the forms that give shape to matter, thereby creating the visible world, but He also creates matter itself.<sup>148</sup> It follows that the old Greek saw that *ex nihilo nihil fit* is wrong: creating *ex nihilo* is precisely what God does.

There is, moreover, another crucial difference between the creative activity of God and of Nature. Nature needs time and the process of generation (*kai khronou kai geneseōs*) in order to create: here we may think of the way Nature guides the development of an embryo into an adult living being. God, in contrast, gives existence to things timelessly and without any process of generation or development (*akhronōs kai aneu geneseōs*), and He does so by His will alone.<sup>149</sup>

Once again, a number of things are interesting about this text. First, a version of it was translated into Arabic, where it was attributed (once again) to Alexander of Aphrodisias and circulated under the title “Treatise by Alexander of Aphrodisias, refuting the doctrine that affirms that nothing comes about from nothing, and establishing that everything only comes about from nothing”.<sup>150</sup> Second, it was taken up

<sup>146</sup> Cf. Philoponus, *In de an.*, p. 297, 2-3: ἐνέργεια δὲ ἐστὶν ἡ τελεία προβολὴ τῆς ἕξεως μηδὲν τῆς ἕξεως ἀλλοιοτέρας γινομένης.

<sup>147</sup> Philoponus, *Against Aristotle*, fr. 115 Wildberg = Simplicius, *In Phys.*, 1141, 10ff.

<sup>148</sup> We have seen is reason to believe that Philoponus may have picked up this doctrine from Porphyry, the arch-enemy of Christianity; cf. Chase 2011, 145ff.

<sup>149</sup> Note the slight shift in emphasis here: whereas for most post-Plotinian Neoplatonists God creates by being alone (*autōi tōi einai*), for Philoponus God creates by willing alone (*arkei (...) autōi monon to thelein*). Hierocles, as we have seen, is an exception to this rule.

<sup>150</sup> *Maqālatu al-Iskanadari al-Afrūdīsī fī ibtālī qawli man qāla innahu lā yakūnu šay'un illā min šay'in wa iḥbātī anna kulla šay' innamā yakūnu lā min šay'in*. This important discovery is due to Ahmad Hasnawi (1994).

and used by al-Kindī, the early Islamic philosopher who was the driving force behind the redaction of the *Plotiniana Arabica* and the *Liber de Causis*, as we can see from our **Text K**. Here, al-Kindī argues, very much like Philoponus, that since God is powerful enough to create without matter – that is, *ex nihilo* – he also does not require time to create the world. Probably owing to its adoption by al-Kindī, the doctrine of instantaneous creation also found its way into the *Theology of Aristotle*, as we can see in our **Text L**. Here, Plato is praised for having claimed that God is the Creator of the intellect, soul, and nature, but although Plato may appear to be claiming that this creation takes place in time, this mode of expression was merely for pedagogical purposes. In fact, God's creation takes place outside of time, and is simultaneous with its effect: in other words, it is instantaneous.

Most importantly for our present purposes, Philoponus' text is clearly the origin of the interpolation in our Proclus text from which we started out. As we recall, the interpolator stated there that the highest cause, i.e. God, creates from nothing, while nature creates “from the change of something previous to it”, i.e. from a substrate.

We now know, I submit, where the interpolator got this doctrine from: Philoponus' work *Against Proclus on the eternity of the world* (although he may well have thought he was reading a treatise by Alexander). Proposition 76 of Proclus' *Elements of Theology* was thus transmitted to the Arab world already provided with a correction by Proclus' adversary Philoponus.<sup>151</sup>

Most important of all, I think, we are now in a position to understand the doctrinal motivations behind our interpolation. If our interpolator corrected Proclus by means of Philoponus, it is because he knew that Proposition 76 of the *Elements of Theology* could be and in fact was used to argue against the Abrahamic dogma of God's freely willed creation within time. If God is to be unmoved, He must always create by His very being, and therefore the world, as His creation, must always exist. The alternative, according to Proclus, is to allow that God is moved or changed, but this would entail two unacceptable consequences. First, since motion is an incomplete or imperfect activity, it would mean attributing imperfection or incompleteness to God. Second, since all motion takes place within time, it would mean that God, who is to be considered the Creator of time, would stand in need of time in order to carry out his creative activity. God must therefore always create, and the world is therefore eternal, or rather perpetual: it cannot have been created at a specific moment in time, after not having existed.

The way Philoponus tried to refute these Proclan objections was, as we have seen, rather ingenious. Yes, he says, God carries out a creative activity (*energeia*), but Proclus is wrong to conclude from that one can attribute a motion (*kinêsis*) to God. Not all

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<sup>151</sup> It may well be the case that our interpolation started out as a marginal gloss by an Islamic scribe, reader, translator or editor who knew this Proposition had been used (by Proclus himself!) to argue against the creation of the world in time, and also knew that Alexander/Philoponus' modification could be used to defuse Proclus' objection and render Proclus' thought compatible with a creationist theology such as that of Islam.

*energeiai* are *kinêseis*. *Kinêseis* are necessarily imperfect and take place in time: they characterize a process in which a thing has not yet reached its goal. But there is another kind of *energeia*, characteristic of things that have already achieved their goal. This kind of perfect or complete *energeia* is a projection from or activation of an acquired state (*hexis*): when I read or write Greek after learned it, such activation does not bring about any motion or change in me, but is simply the full realization of what I already am. What is more, such activation of a *hexis* does not take place in time: like such phase transitions as the freezing of water<sup>152</sup> or the curdling of milk, or activities of our senses such as seeing or touching, they take place *en tōi nun*, in the instant, or *athroōs*, all at once. In other words, they are instantaneous.<sup>153</sup> Likewise, for Philoponus, God's creation of the world is the instantaneous activation of His *hexis* as Creator: it takes no time and implies no change on His part. Creation is merely the realization of God's essence *qua* benevolent Creator.

We have here, in conclusion, an example of the transmission of Greek thought to Islamic philosophy that exhibits several features that are typical of this process, not least of which is its complexity. Ideas developed by the Christian John Philoponus have been found to be interpolated into a paraphrastic translation of a text by the anti-Christian pagan Proclus; the resulting text is attributed to Alexander of Aphrodisias, and similar themes wind up in the *Theology of Aristotle*, a text based on a paraphrastic translation of Plotinus but attributed to Aristotle.

Despite the complexity of this process of transmission and adaptation, and the obscurity of many of its details, the end result is reasonably clear. Thanks to the *Theology of Aristotle*, the *Liber De Causis*, and other similar apocrypha, Islamic thought was henceforth provided with a Neoplatonizing supplement to Aristotle's *Metaphysics*, which taught a system of emanation of all reality from the highest good, combined with Creationist tendencies that rendered it compatible with a monotheistic religion, while harmonizing the philosophies of Plato and Aristotle. Whatever one may think of the philosophical value of such a project, it cannot be denied, I think, that it was a tremendous success, deeply influencing subsequent thought in both Sunni and Shi'ite Islam, in Medieval Jewish thought, and in Western Scholasticism.

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<sup>152</sup> Cf. Aristotle, *Physics* 8, 3, 253b6-26, *De sensu*; 6, 446b28-447a13.

<sup>153</sup> Cf. Croese 1998, 51 *et passim*; Chase 2011. Al-Kindi and his circle of translators, who were responsible for the constitution of the *Plotiniana Arabica* and the *Liber de Causis*, eagerly adopted Philoponus' doctrine of instantaneous change, so much so that when Kindi came to discuss the Aristotelian list of types of motion or change (transportation, generation, corruption, augmentation, diminution, alteration), he added a new type: the motion of creation (*al-ḥarakatu al-ibdāʿ*), which differs from generation in that the motion of creation does not take place out of a preexistent substrate. Cf. Abū Sulaymān al-Sijistānī, in Abū Ḥayyān al-Tawḥīdī, *al-Imtāʿ wa-l-muʿānasa*, vol. 3, p. 133 Amin/al-Zayn, quoted by Rashed 2008, 53 (cf. Altmann-Stern 1958, 69-70).

## TABLES

**Table 1. Does the universe have a beginning and an end?**

	<i>Beginning</i>	<i>End</i>	<i>Periodicity</i>
Simplicius	No	No	No
Philoponus	Yes	Yes	No
Plato ( <i>Timaeus</i> interpreted literally)	Yes	No	No
Stoics	Yes	Yes	Yes

**Table 2. Timeline of the universe**

<i>Period</i>	<i>Time after the Big Bang</i>	<i>Characteristics</i>
1. Planck epoch	0 to $10^{-43}$ seconds	Fundamental forces (electromagnetic, strong and weak) united.
2. Grand unification epoch	$10^{-43}$ to $10^{-36}$ seconds	Fundamental forces separate into strong and weak force. Temperature: $10^{28}$ - $10^{15}$ Kelvin.
3. Inflation	$10^{-36}$ and $10^{-32}$ seconds	Exponential growth.
4. Quark-gluon plasma	$10^{-30}$ seconds – 1 second	Predominance of radiation; quarks and gluons condense into protons and neutrons. Temperature $10^{12}$ K.
5. Nucleosynthesis (nucleus-electron plasma)	1 – 100 seconds	Predominance of matter; protons & neutrons to form atomic nuclei (deuterium, helium, lithium). <sup>154</sup> Light trapped in the plasma soup. Temperature $10^8$ K.
6. Recombination	379,000 years	Protons, electrons bind together to form hydrogen atoms; photons released; decoupling, surface of last scattering; origin of CMB. Temperature $4 \times 10^3$ K.

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<sup>154</sup> The distribution of these elements, predicted by George Gamow in 1948 and subsequently confirmed experimentally, played an important role in the acceptance of the Big Bang theory.

7. Formation of stars and galaxies, including our solar system 9-12 billion years ago
8. Predominance of dark energy 5 billion years ago – present Accelerated expansion.

**Table 3. The geometry and curvature of space<sup>155</sup>**

<i>Geometry of space-time</i>	<i>Type of universe</i>	<i>Curvature</i>	<i>Omega (<math>\Omega_M \Omega_M</math>)<sup>156</sup></i>	<i>Spatio-temporal dimensions</i>	<i>Angles of a triangle</i>	<i>Universe's future</i>
Spherical <sup>157</sup>	closed	positive	$> 1$ <sup>158</sup>	finite	$>180^\circ$ parallel lines converge	Big Crunch (cosmic density of matter $>$ critical density; gravity triumphs over expansion).
Hyperbolic/pseudo-sphere (saddle-shaped)	open	negative	$< 1$	infinite	$<180^\circ$ ; parallel lines drift apart	Expansion continues forever, leading to empty world (cosmic density of matter $<$ critical density; expansion triumphs over gravity).
Euclidean <sup>159*</sup> (table top)	flat	zero	1	infinite	$180^\circ$ parallel lines remain parallel	Expands forever, but rate of increase gradually slows down (cosmic density of matter = critical density; expansion and gravity are in equilibrium).

<sup>155</sup> Friedmann's assumption that the universe is homogeneous – that is, that it has the same density of matter everywhere, which implies that the universe's curvature should also be identical everywhere – basically restricts the possibilities of the universe's shape to three (Magueijo 2003, 89).

<sup>156</sup>  $\Omega_M$  designates the matter content of the universe, or more precisely the ratio between the universe's gravitational energy and the energy of its expansion (Magueijo 2003, 94; Panek 2011, 128). The critical density, at which the universe is neither open nor closed, is estimated at one gram per hundred trillion cubic kilometers of space (Hooper 2006, 162).

<sup>157</sup> It should be recalled that the sphere in question is three-, not two-dimensional.

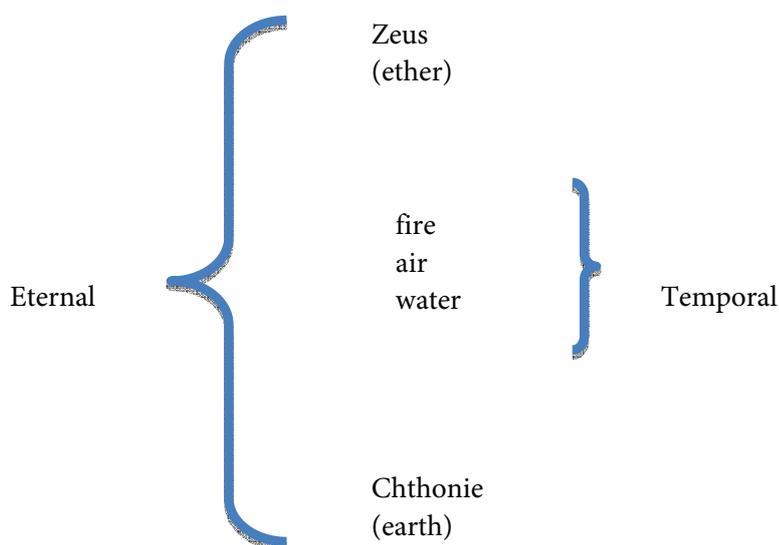
<sup>158</sup> In a closed universe, the universe's gravitational energy exceeds its kinetic energy.

<sup>159</sup> Current data appears to be consistent with this alternative (cf. Grain 153; Penrose 2010, 66; Frampton 2010, 79).

**Table 4. Dark energy equations of state**

<i>Equation of state</i>	<i>Dark matter density</i>	<i>Dark energy density</i>	<i>Results</i>
Constant, = -1 (= Einstein's cosmological constant)	declines	remains constant	Dark energy dominates as time goes by, universe continues to expand, never contracts.
Constant, > -1		increases	Universe's scale factor (size) soon becomes infinite, cosmological time ends ; Big Rip (everything torn apart by repulsive gravitational force)

**Table 5. Pherecydes on time and the elements**



**Table 6. Athanasius on the generation of the Son and the creation of the world**

<i>Type of creation</i>	<i>Relation to God's essence</i>	<i>Relation to God's will</i>	<i>Relation to time</i>
<i>poiêma</i> (world)	outside divine essence	dependent	in time
<i>gennêma</i> (Son)	<i>idion tês ousias</i> <i>gennêma/ex autou</i> <i>phusei gennômemon</i>	not dependent	eternal

## TEXTS

**Text A:** Porphyry, *In Tim.*, fr. 50, p. 36, 3ff. Sodano = Proclus, *In Tim.*, I, 393, 1-13 Diehl

αὐθις δὲ μεταβαλλόμενοι λέγουσιν εἶναι καὶ ἄνευ τοῦ δημιουργεῖν τὸν θεόν, οὐδὲ τοῦτο εἰδότες, ὅτι αἱ ἀληθεῖς δυνάμεις αὐτῶ τῶ εἶναι ἐνεργοῦσι, καὶ ἡ αὐξητική δύναμις καὶ ἡ θρεπτική αὐτῶ τῶ εἶναι τρέφει τὸ σῶμα καὶ αὐξει. οὕτω δὴ οὖν καὶ ἡ ψυχὴ ψυ- (5) χοῖ καὶ ζωοποιεῖ καὶ κινεῖ τὸ ὄργανον ἑαυτῆς· οὐ γὰρ προελομένων ἡμῶν αἰσθάνεται ἢ σφύζει τὸ σῶμα, ἀλλ' ἡ παρουσία μόνον τῆς ψυχῆς ἀποτελεῖ τὰς ἐνεργείας ταύτας.

ἔτι τὸ πᾶν πρὸς τι πεφυκὸς αἰεὶ κατ' οὐσίαν ἔχει ἐκείνην τὴν δύναμιν, τὸ δὲ ἄλλοτε ἄλλως μεταβαλλόμενον ἐπίκτητον. (10) εἰ μὲν οὖν ὁ θεὸς αἰεὶ δημιουργεῖ, σύμφυτον ἂν ἔχοι τὴν δημιουργικὴν δύναμιν· εἰ δὲ μή, ἐπίκτητον.

Shifting ground once again, they [sc. the followers of Atticus] say that god exists even without creating; but they do not even know that *true powers act by their very being (autōi tōi einai)*: both the power of growth and the nutritive power feed and increase the body by their very being. Indeed, this is how the soul animates, (5) vitalizes and moves its instrument, for the body does not sense nor does the pulse beat as the result of our previous choice, but it is the soul's mere presence that carries out these activities.

Further, there is the fact that everything that naturally tends toward something has that power by essence (*kat'ousian*), while that which changes in various ways at different time is adventitious (*epiktētos*). (10) If, then, god always creates, his creative power will be innate (*sumphutos*); if not, it will be adventitious (*epiktēton*).

**Text B:** Porphyry, *In Tim.*, fr. 47, p. 30, 9-32, Sodano = Philoponus, *De aet. mundi* 6, 14, p. 164, 12 - 165, 16 Rabe

οὐκ ἔστιν ταῦτόν κόσμου ποίησις καὶ σώματος ὑπόστασις οὐδὲ αἱ αὐταὶ ἀρχαὶ σώματός τε καὶ κόσμου, ἀλλ' ἵνα μὲν κόσμος γένηται, δεῖ σώματα (20) εἶναι καὶ θεὸν εἶναι, ἵνα δὲ σώματα, δεῖ ὕλην εἶναι καὶ θεὸν καὶ τὸ ἐπιγινόμενον ἄλλο μὲν, ἵνα σωματωθῇ ὕλη, ἄλλο δέ, ἵνα τὰ σωματωθέντα ταχθῇ.

ταῦτα δὲ αἰεὶ ἅμα γίνεται πάντα καὶ οὐ χρόνω διηρ (165) τημένα, ἀλλ' ἡ γε διδασκαλία ἀναγκαίως διαίρει, ἵνα διδάσκη ἀκριβῶς τὸ γιγνόμενον· σώματος μὲν γὰρ ἀρχαὶ θεὸς μὲν γεννῶν, ὕλη δὲ καὶ τὰ σχήματα, ἃ προϊῶν ἡμᾶς διδάξει, ὡς ἐξ ὧν συνέστηκεν τὰ σώματα γεννηθέντων ἀπὸ θεοῦ, κόσμου δὲ

The creation of the world and the subsistence of bodies are not the same thing, nor are the principles of body and world the same, but in order for the world to be generated, bodies and (20) god must exist, and in order for bodies <to be generated>, there must be matter and god, and what supervenes: one <supervening> thing for matter to be turned into bodies, and another for the things turned into bodies to be ordered. *But all these always take place at the same time*, and are not separated (165) by time, but pedagogy necessarily separates them, so that it can accurately teach what happens. For the principles of body are god (who generates), matter, and the figures, about which he will teach us later,<sup>160</sup> in the

<sup>160</sup> That is, the geometrical figures, ultimately triangles, out of which the universe is

τὰ ἤδη ὑποστάντα (5) σώματα ὑπὸ θεοῦ καὶ θεὸς ὁ ταῦτα τάσσων·

sense that that from which bodies came into being were generated by god, but the <principles of> the world are the (5) bodies that have already been brought into being by god, and god, who sets them in order.

**Text C:** Proclus and Porphyry *apud* Philoponus, *De aet. mundi*, p. 224, 12ff. Rabe

ἄπερ δὲ ὁ Πρόκλος ἐν τῷ πολλάκις μνημονευθέντι ὑπὲρ τοῦ Τιμαίου πρὸς Ἀριστοτέλην λόγῳ ἐκ τῶν Πορφυρίου πάλιν μεταγραφά- (20) μενος τίθησιν ἐκ περιόδων δεικνύειν πειρώμενος, ὡς ἀναρχον εἶναι τὴν τοῦ κόσμου γένεσιν ὁ Πλάτων ᾤετο, διότι τε τὸ τοῦ κόσμου παράδειγμα αἰώνιον εἶναι λέγει καὶ διότι αἰτίαν εἶναι φησὶν τῆς τοῦ κόσμου ὑπάρξεως τὴν τοῦ θεοῦ ἀγαθότητα (‘ἀγαθὸς (225) γὰρ ἦν’, φησὶν ὁ Πλάτων, ‘ἀγαθῷ δ’ οὐδεὶς περὶ οὐδενὸς οὐδέποτε ἐγγίνεται φθόνος’), ἐξ ὧν ὁ Πρόκλος συνάγει, ὅτι, εἰ τὸ τοῦ κόσμου παράδειγμα αἰεὶ ἐστίν, ἀνάγκη καὶ τὴν τοῦ παραδείγματος εἰκόνα τὸν κόσμον αἰεὶ εἶναι καὶ ὅτι, εἰ αἰεὶ ἄφθονος ὁ θεός, (5) ἐπεὶ καὶ αἰεὶ ἀγαθός, αἰεὶ καὶ ὁ κόσμος ἔσται ἢ, εἰ μὴ αἰεὶ ἐστίν ὁ κόσμος, δυνάμει εἶναι καὶ τὸν τούτου δημιουργὸν καὶ διὰ τοῦτο ἀτελεῖ καὶ χρόνον δεόμενον.

...what Proclus postulates in the work on the *Timaeus* against Aristotle, which we have often mentioned, once again copying (20) Porphyry, trying to show on the basis of <cosmic?> periods that Plato thought the becoming of the world is beginningless, because he says the model of the world is eternal, and *because he says the cause of the world's existence is god's goodness* (“For he was (225, 1) good”, says Plato, “and no jealousy with regard to anything ever comes to be within what is good”. From this, Proclus concludes that if the model of the world always exists, then the image of the model, viz. the world, must always exist, and that if god is always free of jealousy, (5) since he is always good, then the world will always exist, or, if the world does not always exist, its creator would be in potency and therefore imperfect and in need of time.

**Text D:** Porphyry, *In Tim.*, fr. 46, p. 29, 15 ff. Sodano = Procl. *In Tim.*, I, 366, 20-368, 1 Diehl

ἐκ δὲ τούτων ἀπάντων συνελθεῖν ῥάδιον, (20) ὅτι καὶ ὁ δημιουργὸς αἰωνίως ποιεῖ, καὶ ὁ κόσμος αἰδιός ἐστι κατὰ τὴν εἰς ἅπαντα τὸν χρόνον ἐκτεινομένην αἰδιότητα, καὶ ὡς αἰεὶ γίγνεται τεταγμένος καὶ ὡς ἄφθαρτος οὐκ ἔστιν αἰεὶ, γίνεται δὲ αἰεὶ ἀγαθυνόμενος, ἀλλ’ οὐκ αὐτόθεν ἀγαθὸς ὧν, ὡς ὁ γεννήσας αὐτὸν πατήρ· πάντα γὰρ ἐν (25) αὐτῷ γινομένως ἐστίν, ἀλλ’ οὐκ ὄντως ὡς ἐν τοῖς αἰωνίοις. (...)

From all these considerations it is easy to conclude (20) both *that the demiurge creates eternally*, and that the world is perpetual in the sense of that perpetuity that extends throughout all time, and that it always comes into being in an ordered state, and that *quia* imperishable, it does not always exist, but it comes into being by being always rendered good, not being good at the outset, like the Father who engendered it. For everything in (25) it exists in the mode of becoming, not in the mode of being, as is the case in eternal things. (...) Does he fail to create, then, because he does not wish to do so, or because

πότερον οὖν οὐ δημιουργεῖ μὴ βουλόμενος ἢ μὴ δυνάμενος; εἰ μὲν δὴ φήσομεν, ὅτι μὴ

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ultimately constituted in the *Timaeus*.

βουλόμενος, λανθάνομεν αὐτοῦ τὴν ἀγαθότητα ἀναιροῦντες· εἰ δὲ μὴ δυνάμενος, ἄτοπον τὸ ποτὲ μὲν δύνάμιν ἔχειν, (5) ποτὲ δὲ ἀδυναμίαν αὐτόν· ἀφαιρήσομεν γὰρ τὸ αἰώνιον. (...)

καὶ διὰ τί μὴ πρότερον, ὅτε εἶδε καλὸν ὄν τοῖς γιγνομένοις τὸ γίνεσθαι, εἶπερ καὶ τότε ἀγαθὸς ἦν καὶ ἠβούλετο πάντα αὐτῷ γενέσθαι παραπλήσια; συνήρτηται ἄρα τῆ μὲν ἀγαθό- (15) τητι τοῦ πατρὸς ἢ τῆς προνοίας ἐκτένεια, ταύτη δὲ ἢ τοῦ δημιουργοῦ διαώνιος ποίησις, ταύτη δὲ ἢ τοῦ παντὸς κατὰ τὸν ἄπειρον χρόνον αἰδιότης, γιγνομένη οὕσα καὶ οὐχ ἐστῶσα αἰδιότης, καὶ ὁ αὐτὸς λόγος ταύτην τε ἀναιρεῖ καὶ τὴν ἀγαθότητα τοῦ πεποιηκότος· εἰ γὰρ ἀγαθὸς αἰεὶ ὁ δημιουργ- (20) γός, αἰεὶ βούλεται τὰ ἀγαθὰ πᾶσιν·

ὡς γὰρ ὁ ἥλιος ἐν ὄσῳ ἐστί, πάντα καταλάμπει, καὶ τὸ πῦρ θερμαίνει—κατ' οὐσίαν γὰρ ἐστὶν ὁ μὲν φωτιστικός, τὸ δὲ πῦρ θερμαντικόν—οὕτω καὶ τὸ αἰεὶ ὄν ἀγαθὸν αἰεὶ βούλεται τὰ ἀγαθὰ·

he is not able? If we say it is because he does not so wish, then we unwittingly eliminate his goodness<sup>161</sup>. If it is because he is not able, then it is absurd for him to sometimes have the power (5) and sometimes impotence; for thus we would eliminate his eternity. (...) And why did he not <set it in motion> earlier, when he saw that coming into being is good for things that come into being, since he was good then too, and wished everything to become like himself? Therefore, the extension of providence (15) is closely related to the Father's goodness, and closely related to this extension is the Demiurge's everlasting creation, and closely related to this is the universe's perpetuity throughout infinite time, a perpetuity that is coming-into-being and not steadfast, and the same argument eliminates it and the Creator's goodness. For if the Demiurge is always (20) good, he always wishes good to all things. *For as the sun illuminates all things insofar as it exists, and fire heats – for it is by essence that the former illuminates and the latter heats – so that which is always good always wills good things.*

**Text E:** Methodius, *On generated things*, ap. Photius, *Library*, 302a30ff

Ὅτι ὁ Ὀριγένης, ὃν Κένταυρον καλεῖ, ἔλεγε συναΐ- (30) διον εἶναι τῷ μόνῳ σόφῳ καὶ ἀπροσδεεῖ Θεῷ τὸ πᾶν. Ἐφασκε γάρ· εἰ οὐκ ἔστι δημιουργὸς ἄνευ δημιουργημάτων ἢ ποιητῆς ἄνευ ποιημάτων, οὐδὲ παντοκράτωρ ἄνευ τῶν κρατουμένων (τὸν γὰρ δημιουργὸν διὰ τὰ δημιουργήματα ἀνάγκη καὶ τὸν ποιητὴν διὰ τὰ ποιήματα καὶ (35) τὸν παντοκράτορα διὰ τὰ κρατούμενα λέγεσθαι), ἀνάγκη ἐξ ἀρχῆς αὐτὰ ὑπὸ τοῦ Θεοῦ γεγενῆσθαι, καὶ μὴ εἶναι χρόνον ὅτε οὐκ ἦν ταῦτα. Εἰ γὰρ ἦν χρόνος ὅτε οὐκ ἦν τὰ ποιήματα, ἐπεὶ τῶν ποιημάτων μὴ ὄντων οὐδὲ ποιητῆς ἐστὶν, ὅρα οἶον ἀσεβὲς ἀκολουθεῖ. Ἀλλὰ καὶ ἀλλοιοῦσ- (40) θαι καὶ μεταβάλλειν τὸν ἄτρεπτον καὶ ἀναλλοίωτον

That Origen, whom he [sc. Methodius] calls the Centaur, said that the universe is co- (30) perpetual with God, who alone is wise and without need. For he said: if there is no creator without creation, or maker without things made, or all-ruler without things to be ruled over (for the creator must be called creator because of his creations, and the maker because of what he makes, and (35) the all-ruler because of the things ruled), they must have been brought into existence by God from the beginning, and there must not have been a time when these things did not exist. For if there were a time when the things made did not exist, since there is no maker if the things made do not exist, see

<sup>161</sup> Again, we say the influence of Plato's postulate: God's goodness necessarily entails his constant creation.

συμ- (302b) βήσεται Θεόν·

*εἰ γὰρ ὕστερον πεποίηκε τὸ πᾶν, δῆλον ὅτι ἀπὸ τοῦ μὴ ποιεῖν εἰς τὸ ποιεῖν μετέβαλε. Τοῦτο δὲ ἄτοπον μετὰ τῶν προειρημένων. Οὐκ ἄρα δυνατόν λέγειν μὴ εἶναι ἀναρχον καὶ συναΐδιον τῷ Θεῷ τὸ πᾶν.*

what impieties follow. But it will also (40) result that the unchanging and unalterable God will be altered (302b) and changed. *For if he created the universe later, it is clear that he changed from not creating to creating; but this is absurd* after what has been previously said. It is therefore impossible to say that the universe is not beginningless and co-perpetual with God.

**Text F:** Hierocles *apud* Photius, *Library*, cod. 251, p. 461b6-9

Ὅτι δημιουργὸν θεόν, φησί, προϋφίστησιν ὁ Πλάτων ἐφεστῶτα πάσης ἐμφανοῦς τε καὶ ἀφανοῦς διακοσμῆσεως, ἐκ μηδενὸς προϋποκειμένου γεγεννημένης· ἀρκεῖν γὰρ τὸ ἐκείνου βούλημα εἰς ὑπόστασιν τῶν ὄντων.

That Plato, he says, makes a demiurgic god pre-exist, who is in charge of the entire visible and invisible order, which did not come into existence out of anything pre-existent. *For his will is sufficient for beings to come into existence.*<sup>162</sup>

**Text G:** Hierocles, *On Providence*, Book II, *ap.* Photius, *Library*, cod. 251, p. 463 b 30ff. Bekker, vol. VII, p. 198 Henry = Dörrie-Baltes V, Baustein 141.3, p. 472-4

Ὅτι φησί, κατ' οὐσίαν ἐκεῖνα λέγεται ποιεῖν ὅσα μένοντα ἀτρέπτως ἐν τῇ αὐτῶν οὐσίᾳ καὶ ἐνεργείᾳ, καὶ (30) μηδὲν ἑαυτῶν ἀπομερίζοντα μηδὲ κινουῦντα πρὸς τὴν τῶν γεννωμένων ὑπόστασιν, κατ' αὐτὸ μόνον τὸ εἶναι ὃ ἐστὶ παράγει τὴν τῶν δευτέρων γένεσιν. Οἷς ἔπεται μήτε ὕλη προσχρῆσθαι μήτε ἀπὸ χρόνου ποιεῖν μήτε εἰς χρόνον παύεσθαι μήτε ἔξω τῆς τοῦ ποιούντος ἐνεργείας κείσθαι (35) τὸ γινόμενον· ταῦτα γὰρ πάντα τῇ κατὰ συμβεβηκὸς ἐνεργείᾳ παρέπεται ἐπὶ τοῦ οἰκοδόμου καὶ τῶν ὁμοίων.

The author writes: those things of which it is said that they act according to their essence are those that remain immutable in their own essence and in their activity, without (30) detaching anything from themselves, without setting themselves in motion in order to bring about the existence of engendered beings, but which, *merely according to the very being which they are*,<sup>163</sup> bring about the generation of secondary things. It follows that they do not utilize matter in addition, *that they do not act from a moment in time*, that they do not cease to act at a moment of time, and that that which comes into being does not exist outside (35) of the activity of what produces it. Indeed, all things of this kind accompany the activity which is accidental, as in the case of an architect and in other similar cases".

<sup>162</sup> Cf. Hierocles, *Commentary on the Golden Verses*, 20, 12: τὰ ὄντα πάντα ταῖς αἰδίσις αὐτοῦ βουλήσεσιν ὑφέστηκε,

<sup>163</sup> κατ' αὐτὸ μόνον τὸ εἶναι ὃ ἐστὶ refers to the neuter plural subject: this turn of phrase is intended to designate that being which remains purely being. For the expression, cf. Proclus, *El. Theol.*, prop. 174.

**Text H:**

Proclus, *Elements of theology* prop. 76, p. 72, 5 ff. Dodds

Proclus, *Faṣl fī al-‘illa al-awwal wa-l-ma‘lūl al-awwal*, p. ʿV Endress (from ms. C = Istanbul, Carullah 1279, no. IX 7, 9th/15th cent., foll. 65a27ff.)

(76.) Πᾶν μὲν τὸ ἀπὸ ἀκινήτου γινόμενον αἰτίας ἀμετάβλητον ἔχει τὴν ὕπαρξιν· πᾶν δὲ τὸ ἀπὸ κινουμένης, μεταβλητὴν.

All that comes into being from an unmoved cause has an unchangeable existence. All that <comes into being> from a cause that is in motion has a changeable <existence>.

*Kull mā kāna min ‘illa lā tataḥarraku fa-ḡālīka-l-šay’ kāna bi-lā istiḥāla wa bi-lā taghyīr, wa kull mā kāna min ‘illa mutaḥarrīk fa-ḡālīka-l-šay’ kāna bi-istiḥāla wa taghyīr.*

All that comes from an unmoved cause is without alteration<sup>164</sup> and change, and all that comes from a moved cause is accompanied by change and modification.

*aqūl inna kull mukawwin kāna min al-‘illa al-ūlā, fa-ḡālīka kāna min ghayri istiḥāla min šay’ āḥar qablahu bal innamā kāna min lā šay’, wa kull mukawwin kāna min al-‘illa al-ṭaniyya a’ nī al-ṭabī‘a, fa-ḡālīka lam yakun min lā šay’ <bal> innamā kāna min istiḥāla šay’ āḥar qablahu.*

I say: everything generated from the highest cause is without alteration on the part of something previous to it, **but rather it comes from nothing**, and everything generated from the secondary cause, I mean nature, does not come about from nothing, but from the change of something previous to it.

εἰ γὰρ ἀκίνητόν ἐστι πάντη τὸ ποιοῦν, οὐ διὰ κινήσεως, ἀλλ’ αὐτῷ τῷ εἶναι παράγει τὸ δεύτερον ἀφ’ ἑαυτοῦ· εἰ δὲ τοῦτο, σύνδρομον ἔχει τῷ ἑαυτοῦ εἶναι τὸ ἀπ’ αὐτοῦ· εἰ δὲ τοῦτο, ἕως ἄν (5) ἦ, παράγει. ἀεὶ δὲ ἔστιν· ἀεὶ ἄρα ὑφίστησι τὸ μετ’ αὐτό· ὥστε καὶ

For if what creates is entirely unmoved, it produces what comes second out of itself not by motion but *by its very being*. But if this is so, it has what derives from it as concomitant with its being. But if this is so, it produces as long (5) as it exists. But it always exists.

<sup>164</sup> On the equivalence of *istiḥāla* to the Greek *alloiōsis*, cf. Endress 230.

τοῦτο αἰεὶ γίνεται  
ἐκεῖθεν καὶ αἰεὶ ἔστι,  
τῷ ἐκείνου αἰεὶ κατὰ  
τὴν ἐνέργειαν  
συνάψαν τὸ ἑαυτοῦ  
κατὰ τὴν πρόοδον  
αἰεὶ.

Therefore, it always  
brings into existence  
what comes after it.  
Thus, the latter al-  
ways come into be-  
ing from thence, and  
always exists, having  
joined its <being>,  
which is always in  
the mode of proces-  
sion, to <the being>  
of that one, which is  
always in the mode  
of actuality.

εἰ δὲ δὴ κινεῖται τὸ  
αἴτιον, καὶ τὸ ἀπ’  
αὐτοῦ γινόμενον  
ἔσται μεταβλητὸν  
κατ’ οὐσίαν· ὥ γὰρ τὸ  
εἶναι διὰ κινήσεως,  
τοῦτο τοῦ (10)  
κινουμένου  
μεταβάλλοντος  
μεταβάλλει τὸ εἶναι.  
εἰ γὰρ ἐκ κινήσεως  
παραγόμενον  
ἀμετάβλητον αὐτὸ  
μένει, κρεῖττον ἔσται  
τῆς ὑποστησάσης  
αἰτίας. ἀλλ’  
ἀδύνατον. οὐκ ἄρα  
ἀμετάβλητον ἔσται.  
μεταβαλεῖ ἄρα καὶ  
κινήσεται κατ’  
οὐσίαν, τὴν  
ὑποστήσασαν αὐτὸ  
κίνησιν μιμούμενον.

But if the cause is in  
motion, what comes  
into being from it  
will also be essential-  
ly changeable. For  
that which has its  
being through mo-  
tion changes its be-  
ing (10) when what  
is in motion changes.  
For if, being pro-  
duced through mo-  
tion, it itself re-  
mained  
unchangeable, it  
would be stronger  
than the cause that  
brought it into exist-  
ence. But that is im-  
possible. It will  
therefore not be un-  
changeable. It will  
therefore change and  
be in motion essen-  
tially, imitating the  
motion that brought  
it into existence.

**Text I:** Proclus, *On the Eternity of the World*, apud Philoponus, *aet. mundi*, p. 55, 22 ff. Rabe, trans. Lang & Macro 2001, p. 51

The Fourth Argument of Proclus the Succesor. Fourth. All that is generated from a cause that is unmoved (25) according to its

Πρόκλου διαδόχου λόγος τέταρτος.  
“Τέταρτος· πᾶν τὸ ἐξ ἀκινήτου γινόμενον  
αἰτίου (25) κατὰ τὴν ὑπαρξιν ἀκινήτὸν ἔστιν.

substantial reality is unmoved. For if the maker (p. 56, 1 Rabe) is unmoved, he is unchangeable, and if unchangeable, *then he produces by virtue of his very being*, given that he shifts neither from making to not making nor from not making to making. For if he shifts, he will undergo change in the very transition from the one to the other, and if he undergoes change, he would (5) not be unmoved. If therefore something is unmoved, it will either never make or always make, lest it be moved by virtue of making at some point in time. *Therefore, if something unmoved is a cause of something, causing neither never nor at some point in time, then it is always a cause, and if so, it is the cause of something perpetual.*

If, however, the cause of the all (10) is unmoved — for if it were moved, it would be earlier incomplete and later complete (*since all motion is incomplete actuality*) and lest, if it were moved, it, which produces time, would be in need of time — then the all must be perpetual, since it comes to be from an unmoved cause. Therefore, if someone, intending to pay respect to (15) the cause of the all, should say that the cause alone is perpetual and the cosmos is not perpetual, by stating that the latter is not perpetual he asserts that the former is moved rather than unmoved. By calling the cause moved rather than unmoved, he says that it is not always complete but is at one time incomplete, *because every motion (20) is incomplete actuality* and so needs something inferior (I mean time) by the very fact of its being moved; yet because he says it is sometimes incomplete and not always complete, i.e., needing something inferior, he in fact shows exceptional impiety.

**Text J:** Philoponus, *Against Aristotle on the Eternity of the World*, fr. 115 Wildberg = Simplicius, *In Phys.*, p. 1141, 12-30 Diel

“...even if nature produces what it fashions out of existent things, by virtue of the fact that it has both its substance and its activity

εἰ γὰρ τὸ ποιῶν (56) ἀκίνητον, ἀμετάβλητόν ἐστιν, εἰ δὲ ἀμετάβλητον, αὐτῷ τῷ εἶναι ποιεῖ μὴ μεταβαῖνον ἐκ τοῦ ποιεῖν εἰς τὸ μὴ ποιεῖν μηδὲ ἐκ τοῦ μὴ ποιεῖν εἰς τὸ ποιεῖν· μεταβαῖνον γὰρ ἔξει μεταβολὴν αὐτὴν τὴν ἐκ θατέρου μετάβασιν εἰς θάτερον, εἰ δὲ ἔξει μεταβολὴν, οὐκ ἂν (5) εἴη ἀκίνητον.

εἴ τι ἄρα ἀκίνητόν ἐστιν, ἢ οὐδέποτε ποιήσει ἢ ἀεὶ, ἵνα μὴ διὰ τὸ ποτὲ ποιεῖν κινήται. ὥστ', εἴ τι ἀκίνητον αἰτίον ἐστίν τινας, οὔτε οὐδέποτε αἴτιον ὄν οὔτε ποτέ, εἴη ἂν ἀεὶ αἴτιον, εἰ δὲ τοῦτο, αἰδίου ἐστίν αἴτιον.

εἰ τοίνυν τὸ αἴτιον τοῦ παντός (10) ἀκίνητόν ἐστιν, ἵνα μὴ κινούμενον ἀτελὲς ἢ πρότερον ὕστερον δὲ τέλειον (*πᾶσα γὰρ κίνησις ἐνέργειά ἐστίν ἀτελής*) καὶ ἵνα μὴ κινούμενον χρόνου δέηται χρόνον παράγον, ἀνάγκη τὸ πᾶν αἰδίον εἶναι ἀπὸ αἰτίου ἀκινήτου γιγνόμενον. ὥστε, εἴ τις εὐσεβεῖν οἰόμενος εἰς (15) τὸν αἴτιον τοῦ παντός ἐκείνον λέγει μόνον αἰδίον τὸν δὲ κόσμον οὐκ αἰδίον, τοῦτον λέγων οὐκ αἰδίον ἐκείνον ἀποφαίνει κινούμενον ἀλλ' οὐκ ἀκίνητον·

κινούμενον δὲ λέγων καὶ οὐκ ἀκίνητον οὐκ ἀεὶ λέγει τέλειον ἀλλὰ ποτὲ καὶ ἀτελεῖ διὰ τὸ πᾶσαν εἶναι κίνησιν (20) ἐνέργειαν ἀτελεῖ καὶ ἐνδεᾶ τοῦ χειρόνος (λέγω δὴ τοῦ χρόνου) δι' αὐτὸ τὸ κινεῖσθαι, ποτὲ δὲ ἀτελεῖ λέγων καὶ οὐκ ἀεὶ τέλειον καὶ ἐνδεᾶ τοῦ χειρόνος ἀσεβεῖ διαφερόντως.”

“πρῶτον μὲν, λέγων, εἰ καὶ ἡ φύσις ἐξ ὄντων ποιεῖ τὰ ὑπ' αὐτῆς δημιουργούμενα διὰ τὸ καὶ τὴν οὐσίαν αὐτῆς καὶ τὴν ἐνέργειαν ἐν

in a substrate, without which it is not capable either of being or of acting, it is not necessary for God, whose substance and activity are transcendent of all beings, to create (15) out of existent things. For in that case, He would be no better than nature, although God creates not only the forms of the things that are fashioned directly by Him, but *it is believed that He produces and fashions matter itself*; for only what is first is ungenerated and uncaused. If, then, God gives existence (20) to matter as well, but matter does not require another matter in order to exist, for it is the first substrate of all natural things, then it is not the case that everything that comes into being does so out of something that exists. For whether matter comes into being from God always or at a given moment, it will certainly have no need of another matter, since it itself is the first substrate of bodies. If what is generated by nature does so out of what exists, therefore, it is not necessary that the things that are generated by God do so out of what exists, (25) since *nature needs both some time and <the process of> generation in order to fashion each natural thing, while God gives existence to what comes into being directly by him timelessly and without generation*, that is, without forming and shaping the particulars. For it is enough for him to will, in order to bring about the substantification (30) of realities”.

**Text K:** Al-Kindi, *On the quantity of Aristotle's books*, p. 375, 9 ff. Abū Rīda

Then Aristotle said (...) that God, may He be praised, does not need a period of time for His creation, in reason of what he made clear, since he established ‘it’ out of ‘not it’; so that he whose ability reached such a point as to produce bodies out of no bodies and to extract being out of not-being, he does not need, since he has the power of producing out of no matter, (15) to produce in time. For since the human act is impossible without matter, the act of the one who does not need matter in order to produce what he produces does not need time.

ὑποκειμένῳ ἔχειν καὶ χωρὶς ἐκείνου μήτε εἶναι μήτε ἐνεργεῖν δύνασθαι, οὐκ ἀνάγκη καὶ τὸν θεὸν τὸν ἐξηρημένην ἔχοντα τῶν ὄντων ἀπάντων καὶ τὴν οὐσίαν καὶ τὴν ἐνέργειαν (15) ἐξ ὄντων δημιουργεῖν. οὕτω γὰρ οὐδὲν ἔξει πλέον τῆς φύσεως, καίτοι γε οὐ μόνον τὰ εἶδη τῶν ἀμέσως ὑπ’ αὐτοῦ δημιουργουμένων ποιεῖ ὁ θεός, ἀλλὰ καὶ αὐτὴν τὴν ὕλην παράγειν καὶ δημιουργεῖν πεπίστευται· μόνον γὰρ τὸ πρῶτον ἀγένητόν ἐστι καὶ ἀναίτιον. εἰ οὖν καὶ τὴν ὕλην (20) ὁ θεὸς ὑφίστησιν (οὐ δεῖται δὲ ἡ ὕλη ἐτέρας ὕλης εἰς ὑπαρξιν· αὐτὴ γὰρ ἐστι τὸ πρῶτον ἀπάντων τῶν φυσικῶν ὑποκειμένων)· οὐκ ἄρα πᾶν τὸ γινόμενον ἐξ ὄντος γίνεται.

εἴτε γὰρ αἰεὶ ὑπὸ θεοῦ γίνεται ἡ ὕλη εἴτε ποτέ, οὐ δεήσειται δὴπουθεν ἐτέρας ὕλης, αὐτὴ τὸ πρῶτον οὖσα τῶν σωμάτων ὑποκείμενον·

οὐκ ἄρα, εἰ τὰ γινόμενα ὑπὸ φύσεως ἐξ ὄντων γίνεται, ἀνάγκη καὶ τὰ ἀμέσως ὑπὸ θεοῦ γινόμενα ἐξ ὄντων γίνεσθαι, εἴπερ ἡ (25) μὲν φύσις καὶ χρόνου δεῖται τινος καὶ γενέσεως, ἵνα ἕκαστον δημιουργήσῃ τῶν φυσικῶν, ὁ δὲ θεὸς ἀχρόνως καὶ ἄνευ γενέσεως, τουτέστι διαπλάσεως τῶν κατὰ μέρος καὶ διαμορφώσεως, τὰ ἀμέσως ὑπ’ αὐτοῦ γινόμενα ὑφίστησιν· ἀρκεῖ γὰρ αὐτῷ μόνον τὸ θέλειν εἰς τὴν τῶν πραγμάτων (30) οὐσίωσιν.”

*tumma qāla (...) innahu, jalla tanā’uhu, lā yahtāju ilā madda l-ibdā’ihi mimma abāna, li-annahū ja’ala « huwa » min « lā huwa », fa-inna man balaḡat qudratihi anna ya’milu ajrāmā min lā ajrām, fa-ahraja aysa min laysa, fa-laysa yahtāju — id huwa qādir ‘alā-l-‘amal min lā fīna — anna (15) ya’milu fī zamān, li-annahū, id kāna fi’l al-bašar lā yumkinu min ḡayr fīna, kāna fi’l man lā yuhtāju fī fi’l mā yaf’alu ilā fīna lā yahtāju ilā zamān.*

**Text L:** *Theology of Aristotle*, p. 27, 7 ff Badawi = p. 237 d'Ancona et al. = p. 14 Dieterici; trans. Lewis I, §§ 44-58, p. 231

How well and how appropriately does this philosopher [sc. Plato] describe the Creator when he says: “He created mind, soul, nature, and all things else”, but whoever hears the philosopher's words must not pay attention to the letter of his words and imagine that he said that the Creator created the creation in time. If anyone imagines that from his mode of expression, he merely expressed the will to follow the custom of the ancients. The ancients were compelled to mention time in connection with the beginning of creation because they wanted to describe the generation of things,<sup>165</sup> and they were compelled to introduce time into their description of becoming and into *their description of the creation* — which was not in time at all — in order to distinguish between the exalted first causes and the lower secondary causes

(...) But it is not so: *not every agent performs his action in time*, nor is every cause prior to its effect in time.

*wa mā aḥsan wa aṣwab mā waṣafa al-faylasūfu al-bāri'a ta'ālī id qāla: innahu ḥāliq al-'aql wa-l-nafs wa-l-ṭabī'ati wa-sā'ir al-ašyā' kullihā, ḡayr annahu lā yanbaḡi li-sāmi' qawli al-faylasūf anna yanẓaru ilā lafẓihi fayatawawhimmu 'alayhi annahu qāla inna al-bāri'a ta'ālī innamā ḥalaqa-l-ḥalq fī zamānin. fa-innahu wa-in tuwuhhimu ḡālika min lafẓihi wa kalāmihi fa-innahu innamā lafaẓa bi-ḡālika irādata anna yatbi'u 'āda al-awwalīna. fa-innahu innamā uḡturra al-awwalūna ilā ḡikr zamānin fī bad' al-ḥalq li-annahum arādū waṣfa kawn al-ašyā' fa-uḡturru ilā anna **yadḥalū al-zamān fī waṣfihum al-kawn wa-fī waṣfihum al-ḥaliqa al-latī lam takun fī zamānin al-battata.** wa-innamā uḡturra al-awwalūna ilā ḡikr al-zamān 'inda waṣfihum al-ḥaliqa li-yumayyazū bayna al-'ilal al-awwalī al-'āliya wa bayna al-'ilal al-tawānī al-saḡliya (...) wa laysa ḡālika ka-ḡālika, **a'nī annahu laysa kull fā'ilin yaḡ'alu fī'lihi fī zamānin**, wa lā kull 'illa qabla ma'lūlihā bi-zamānin.*

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<sup>165</sup> This was already the view of Taurus, for whom Plato's allegorical description of the creation of the world in the *Timaeus* was intended for the masses, unable to understand the notion of causation in a non-temporal sense.

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