1-P2) Pseudo-Aristotle, "On the Cosmos" (after 200 B.C.E.)

1. I have often thought, Alexander, that philosophy is a divine and really god-like activity, particularly in those instances when it alone has exalted itself to the contemplation of the universe and sought to discover the truth that is in it; the other sciences shunned this field of inquiry because of its sublimity and extensiveness; philosophy has not feared the task or thought itself unworthy of the noblest things, but has judged that the study of these is by nature most closely related to it and most fitting. It was not possible by means of the body to reach the heavenly region or to leave the earth and explore that heavenly place, in the manner once attempted by the foolish Alcmaeon: so the soul, by means of philosophy, taking the mind as its guide, has crossed the frontier, and made the journey out of its own land by a path that does not tire the traveller. It has embraced in thought the things that are most widely separated from each other in place; for it had no difficulty, I think, in recognizing things that were related to it, and with "the soul's divine eye" it grasped things divine, and interpreted them for mankind. This came about because it wished to impart to all unsparingly, as far as possible, a share of its own privileges. So those who have earnestly described to us the nature of a single place, or the plan of a single city, or the size of a river, or the beauty of a mountain, as some have done before now. [. . .] All these might well be pitied for their meanness of spirit, since they are overly wed to commonplaces and pride

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22 I.e., Alexander the Great, whom Aristotle tutored.
3 Otus and Ephialtes, the mythical Giants who tried to reach heaven by piling Pelion on Ossa.—Furley.
4 Probably a quotation: cf. the eye of the soul in Plato, Republic, 533 D.—Furley.
themselves on insignificant observations. The reason is that they are blind to the nobler things—I mean the cosmos and the greatest features of the cosmos. For if they once genuinely gave their attention to these things, they would never wonder at any other; everything else would appear small and worthless to them, in comparison with the matchless superiority of these.

Let us, then, take up the subject, and so far as they are attainable let us theologize about all the greatest features of the cosmos, discussing the nature, position and motion of each. It is right, I think, that even you, the best of princes, should undertake the study of the greatest things, and that philosophy should have no humble intentions, but should greet the most excellent men with worthy gifts.

2. Cosmos, then, means a system composed of heaven and earth and the elements contained in them. In another sense, cosmos is used to signify the orderly arrangement of the universe, which is preserved by God and through God. The center of the cosmos, which is unmoved and fixed, is occupied by "life-bearing earth," the home and mother of living beings of all kinds. The region above it, a single whole with a finite upper limit everywhere, the dwelling of the gods, is called heaven. It is full of divine bodies which we call stars; it moves eternally, and revolves in solemn choral dance with all the stars in the same circular orbit unceasingly for all time. The whole of the heaven, the whole cosmos, is spherical, and moves continuously, as I have said; but there are necessarily two points which are unmoved, opposite one another, just as in the case of a ball being turned in a lathe; they remain fixed, holding the sphere in position, and the whole mass revolves in a circle round them; these points are called poles. If we think of a straight line joining these two together (some call this the axis), it will be a diameter of the cosmos, having the earth at its center and the two poles at its extremities. One of these two stationary poles is always visible, above our heads in the North: it is called 

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5 Pseudo-Aristotle here uses kosmos in a third sense, as a synonym for ouranos. This sense is quite common from Plato onwards.—Furley.
the Arctic pole. The other is always hidden under the earth, in the South: it is called the Antarctic pole.

The substance of the heaven and the stars we call aether, not, as some think, because it is fiery in nature and so burns (they fall into error about its function, which is quite different from that of fire), but because it always moves in its circular orbit; it is an element different from the four elements [being] pure and divine. Now, of the stars which are encompassed in it, some are fixed and move in concert with the whole heaven always keeping the same position in it; in the middle of these the circle of the zodiac, as it is called, set obliquely through the tropics, passes round like a girdle, divided into the twelve regions of the zodiac. The others, the planets, move, according to their nature, at speeds different from the fixed stars and from each other, each in a different circle, in such a way that one is nearer the earth, another higher in the heavens. The number of the fixed stars is not to be known by men, although they all move on one visible surface, namely that of the whole heaven: but the class of planets contains seven units, arranged in the same number of circles in a series, so that the higher is always greater than the lower, and all the seven, though contained one within another, are nevertheless encompassed by the sphere of the fixed stars. The circle which is always in the position next to this sphere is that which is called the circle of Phaenon (the Bright one) or Cronus (Saturn); then comes the circle of Phaëthon (the Shiner) or Zeus (Jupiter); next Pyroes (the Fiery one), named after Heracles or Ares (Mars); next Stilbon (the Glittering one) which some dedicate to Hermes (Mercury), some to Apollo; after this is the circle of Phosphorus (the Light-bearer), which some call after Aphrodite (Venus) and others after Hera; then the circle of the sun; and the last, the circle of the moon, is bounded by the terrestrial sphere. The aether, then, contains the divine bodies and their ordered orbits.

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6 The terms Arctic and Antarctic do not appear in extant literature before Hipparchus (2nd cent. B.C.E.)—Furley.
After the aetherial and divine element, which is arranged in a fixed order, as we have declared, and is also unchangeable, unalterable and impassive, there comes next the element that is through the whole of its extent liable to change and alteration, and is, in short, destructible and perishable. The first part of this is the fine and fiery substance that is set aflame by the aether because of the latter's great size and the swiftness of its motion. In this fiery and disorderly element, as it is called, meteors and flames shoot across, and often planks and pits and comets, as they are called, stand motionless and then expire.

Next under this is spread the air, opaque and icy by nature, but when it is brightened and heated by movement, it becomes bright and warm. In the air, which itself also has the power to change, and alters in every kind of way, clouds are formed and rain falls in torrents; there is snow, frost and hail, and gales and whirlwinds; thunder and lightning, too, and falling thunderbolts, and the clash of innumerable storm clouds.

3. Next to the element of air comes the fixed mass of earth and sea, full of plants and animals, and streams and rivers, some winding about the surface of the earth, others discharging themselves into the sea. This region is adorned with innumerable green plants, high mountains, deep-shaded woodland, and cities established by the wise creature, man; and with islands in the sea, and continents. The inhabited world is divided by the usual account into islands and continents, since it is not recognized that the whole of it is really one island, surrounded by the sea which is called Atlantic. Far away from this one, on the opposite side of the intervening seas, there are probably many other inhabited worlds, some greater than this, some smaller, though none is visible to us except this one; for the islands we know stand in the same relation to our seas as the whole inhabited world to the Atlantic Ocean, and many other inhabited worlds to the whole ocean; for these are great islands washed round by great seas.

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88 The coldness of the air is a Stoic doctrine; Aristotle said it was warm and capable of being inflamed by motion (Meteor. 341 a 18)—Furley.

9 Aristotle apparently thought nothing but sea lay from Gibraltar westwards to India ( Meteor. 362 b 28).—Furley.
The whole mass of the wet element lies on the surface of the Earth, allowing the so-called inhabited worlds to show through where there are projections of the earth; it is this element that would properly be next in order to the air. After this, set in the depths at the center of the cosmos, densely packed and compressed, is the whole mass of the earth, unmoved and unshaken. And this is the whole of that part of the cosmos that we call the lower part. So these five elements, occupying five spherical regions, the larger sphere always embracing the smaller—earth in water, water in air, air in fire, fire in aether—make up the whole cosmos; the upper part as a whole is distinguished as the abode of the gods, and the lower part as that of mortal creatures. Of the latter, some is wet, and this part we call rivers and springs and seas; the rest is dry, and this part we name land and continents and islands.

4. Now let us turn to the most notable phenomena in and about the inhabited world, summarizing only the most essential points. [. . .]

The phenomena of the air are divided into those which are mere appearances and those which are realities: the appearances are rainbows and streaks in the sky and so on; the realities are lights and shooting stars and comets and other such things. [. . .] a light is a kindling of a mass of fire in the air. Some lights shoot like javelins, others are set in one position in the sky. The shooting [star] is a generation of fire by friction in the air; the fire moves rapidly, giving the impression of length because of its rapidity. The latter, the stationary light, is extended and lengthy but keeps the same position, as if it were an elongated star; if it spreads out towards one end it is called a comet. [. . .] So much, then, for the things of the air.

The Earth contains in itself many sources, not only of water, but also of wind and fire. Some of these are subterranean and invisible, but many have vents and blow-holes, like Lipara and Etna and the volcanoes in the Aeolian islands. These often flow like rivers and throw up fiery, red-hot lumps. Some of the subterranean sources, which are near springs of water, impart heat to these: some of the stream they make merely lukewarm, some boiling, and some moderately and pleasantly hot.
Similarly, too, there are in many places on the Earth's surface open vents for the winds, which have various effects on those who approach them, causing ecstatic inspiration, or wasting sickness, or in some cases prophecy. [ . . . ] Often, too, a moderate earth-born wind, forced into deep, hollow caves in the Earth and becoming displaced from its home, causes shocks in many places. Often when a large quantity from outside is confined within the hollows of the Earth and cut off from exit, it shakes the Earth violently, seeking an exit for itself, and produces the effect that we call an earthquake. [ . . . ] There is often, also, a roaring of the Earth without an earthquake, when the wind is not sufficient to shake the Earth but lashes about enveloped in the Earth with tumultuous force. The blasts of wind that enter the Earth are recondensed also by the moisture that is hidden in the Earth.¹⁰

There are also analogous happenings in the sea: chasms occur in the sea; and its waves often withdraw; and there are incursions of waves, sometimes with a recoil, sometimes with a forward rush only, as they say was the case at Helice and Bura.¹¹ Often too there are exhalations of fire in the sea and eruptions of fountains, and rivers are shot forth, and trees grow, and there are currents and vortices like those of the winds, some in the middle of the oceans, some in the narrows and straits. There are many tides and tidal waves too, which are said to occur in concert with the moon at certain definite times.

To sum up, since the elements are mingled one with another, it is natural that phenomena in the air and land and sea should show these similarities, which involve destruction and generation for the individual parts of nature, but preserve the whole free from corruption and generation.

5. Some people, however, have wondered how the cosmos, if it is composed of the "opposite" principles (I mean dry and wet, cold and hot), has not long ago been de-

¹⁰ i.e., wind entering the Earth may a) cause an earthquake, b) cause a roar only, or c) be re-condensed and so cause neither—Furley.
¹¹ Cf. Strabo viii. 7.2 (384 c), i. 3. 10 (54 c), Aristotle, Meteor. 343 b 1, etc., on the destruction of these two cities in Achaia. The date was 373/2 B.C.E.—Furley.
stroyed and perished; it is as if men should wonder how a city survives, composed as it is of the most opposite classes (I mean poor and rich, young and old, weak and strong, bad and good). They do not recognize that the most wonderful thing of all about the harmonious working of a city-community is this: that out of plurality and diversity it achieves a homogeneous unity capable of admitting every variation of nature and degree. But perhaps nature actually has a liking for opposites; perhaps it is from them that she creates harmony, and not from similar things, in just the same way as she has joined the male to the female, and not each of them to another of the same sex, thus making the first harmonious community not of similar but of opposite things. It seems, too, that art does this, in imitation of nature: for painting mixes its whites and blacks, its yellows and reds, to create images that are concordant with their originals; music mixes high and low notes, and longs and shorts, and makes a single tune of different sounds; by making a mixture of vowels and consonants, grammar composes out of them the whole of its art. [. . .] So in the same way the complex of the Universe, I mean the heaven and the Earth and the whole cosmos, by means of the mixture f the most opposite elements has been organized by a single harmony: dry mixed with wet, hot with cold, light with heavy, straight with curved—the whole of earth and sea, the aether, the sun, the moon and the whole heaven have been set in order by the single Power which interpenetrates all things: from things unmixed and diverse, air and earth and fire and water, it has fashioned the whole cosmos and embraced it all in the surface of a single sphere, forcing the most opposite elements in the cosmos to come to terms, and from them achieving preservation for the whole.

The cause of its preservation is the agreement of the elements, and the cause of the agreement is the principle of equal shares and the fact that no one of them has more power than each of the others: for the heavy is in equipoise with the light, and the hot with its opposite. In these greater matters nature teaches us that equality is the preserver of concord, and concord is the preserver of the cosmos, which is the parent of all things and the most beautiful of all.
For what being could be better than this? Anything that might be suggested is a part of it. And everything that is beautiful takes its name from this, and all that is well-arranged; for it is called "well-ordered" after this "universal order". What particular detail could be compared to the arrangement of the heavens and the movement of the stars and the sun and moon, moving as they do from one age to another in the most accurate measures of time? What constancy could rival that maintained by the hours and seasons, the beautiful creators of all things, that bring summers and winters in due order, and days and nights to make up the number of a month or a year? In size too the cosmos is mightiest, in motion swiftest, in brightness most brilliant, in power never-aging and indestructible. It is this that has given a different nature to the creatures of the sea, the land and the air, and measured their lives in terms of its own movements. From this all creatures breathe and take their life. Of this even the unexpected changes are accomplished in due order—the winds of all kinds that dash together, thunderbolts falling from the heavens, and storms that violently burst out. Through these the moisture is squeezed out and the fire is dispersed by currents of air; in this way the whole is brought into harmony and so established. The Earth, too, that is crowned with plants of every kind and bubbles with springs and teems with living creatures everywhere, that brings forth everything in season and nurtures it and receives it back again, that produces a myriad shapes and conditions—this Earth still keeps its never-aging nature unchanged, though it is racked by earthquakes, swamped by floods, and burnt in part by fires. All these things, it seems, happen for the good of the Earth and give it preservation from age to age: for when it is shaken by an earthquake, there is an upsurge of the winds transfused within it, which find vent-holes through the chasms, as I have already said; when it is washed by rain it is cleansed of all noxious things; and when the breezes blow round about it the things below and above it are purified. Furthermore the fires soften things that are frozen, and frost abates the force of the fires. And of the particular things on the Earth some come into being while some are in their prime and others are perishing: and generation is set in the balance against destruction, and de-
struction lightens the weight of generation. There is one single principle of preservation, maintained without interruption among all these things that interchange with one another, ascending to power and declining in turn, and this keeps the whole system safe, eternally indestructible.

6. It remains now to discuss summarily, as the rest has been discussed, the cause that holds the world together; for in describing the cosmos, if not in detail, at least sufficiently to convey an outline, it would be wrong for us to omit altogether that which is supreme in the cosmos. It is indeed an ancient idea, traditional among all mankind, that all things are from God and are constituted for us by God, and nothing is self-sufficient if deprived of his preserving influence. So some of the ancients were led to say that all the things of this world are full of gods, all that are presented to us through our eyes and hearing and all the senses; but in saying this they used terms suitable to the power of God but not to his essence. For God is indeed the preserver of all things and the creator of everything in this cosmos however it is brought to fruition; but he does not take upon himself the toil of a creature that works and labors for itself, but uses an indefatigable power, by means of which he controls even things that seem a great way off. God has his home in the highest and first place, and is called Supreme for this reason, since according to the poet it is on "the loftiest crest" of the whole heaven that he dwells: his power is experienced most of all by the body that is closest to him, less by the next, and so on down to the regions inhabited by us. So earth and the things that are on earth, being at the farthest remove from the help of God, seem to be feeble and discordant and full of confusion and diversity; but nevertheless, in that it is the nature of the Divine to penetrate to everything, even the things around us occur in the same way as the things above us, each having a greater or smaller share of God's help in proportion to its distance from him. So it is better to suppose, what is also fitting and most appropriate to God, that the power which is based in the heavens is also the cause of preservation in the most remote things, as we may say, and indeed in everything, rather than that of itself it carries out its tasks on earth by penetrating and being present where it is
not honorable or fitting that it should. For it is not fitting even among men for princes to superintend each and every action that may have to be done—for example, the commander of an army or leader of a city or head of a household, if it were necessary to pack up bedding or perform some [according to their rank].

[...] 

So also the divine being with a single movement of the nearest element distributes his power to the next part and then to the more remote parts until it permeates the whole. One thing is moved by another, and itself then moves a third in regular order, an things acting in the manner appropriate to their own constitution; for the way is not the same for all things, but different and various, in some cases quite opposite, though the key of the whole movement, as it were, is set by a single opening note. [...] So too in the case of the cosmos: by means of a single revolution of the whole heaven completed in a night and a day, the various motions of all the heavenly bodies are initiated, and though all are embraced in one sphere, some move rapidly and others more slowly, according to their distances and their individual characters. For the moon completes its orbit in a month, waxing and waning and disappearing; the sun and those which have an equal course with it, namely Phosphorus (Venus) and Hermes (Mercury), complete their course in a year, Pyroeis (Mars) in twice this time, Zeus (Jupiter) in twelve years, and lastly the star called after Cronus (Saturn) in two and a half times the period of the one below it.\textsuperscript{12}

The single harmony that is produced by all these as they sing and dance in concert round the heavens has one and the same beginning and one and the same end,\textsuperscript{13} in a true sense giving to the whole the name of "order" [\textit{kosmos}] and not "disorder" (\textit{akosmia}). Just as in a chorus at the direction of the leader all the chorus of men, sometimes of women too, join in singing together, creating a single pleasing harmony with their varied mixture of high and low notes, so also in the case of the god who controls the universe: the note is sounded from on high by him who might well be called the

\textsuperscript{12} \textit{i.e.} thirty years. These periods correspond to those of Eudoxus—Furley.
chorus-master; then the stars and the whole heavens move continually, and the all-shining sun makes his double journey, dividing night from day by his rising and setting, and bringing the four seasons of the year as he moves forwards to the North and back to the South. There are rains in due season, and winds, and falls of dew, and all the phenomena that occur in the atmosphere—all are the results of the first, original cause. These are followed by the springing up of rivers, the swelling of the sea, the growth of trees, the ripening of fruit, the birth of animals, the nurture, the prime and the decay of all things; and the individual constitution of each thing contributes to the process, as I have said. So when the leader and author of all things, unseen except to the eye of reason, gives the sign to every moving thing between heaven and earth, everything is moved continually in its orbit and within its peculiar limits, now disappearing, now appearing, revealing innumerable different forms and concealing them again, all from a single beginning. The process is very like what happens, particularly at moments in a war, when the trumpet gives a signal in a military camp; then each man hears the sound, and one picks up his shield, another puts on his breast-plate, and a third his greaves or helmet or belt; one harnesses his horse, one mounts his chariot, one passes on the watchword; the company-commander goes at once to his company, the brigadier to his brigade, the cavalryman to his squadron, and the infantryman runs to his own station; all is stirred by a single trumpeter to a flurry of motion according to the orders of the supreme commander. It is a similar idea that we must have of the universe: by a single inclination all things are spurred to action and perform their peculiar functions—and this single agent is unseen and invisible. Its invisibility is no impediment either to its own action or to our belief in it; for the soul, whereby we live and build households and cities, though it is invisible is perceived through its deeds: for all the conduct of life is discovered, arranged and maintained by the soul—the ploughing and sowing of land, the inventions of art, the use of laws, the order of a city’s government, the activities of people in their own country, and war and peace with foreign nations. This is what we

13 Cf. Kepler’s discussion of celestial harmonies in 3-P7, pp. 00-00 and 5-P4, pp. 00-00 below.
must also believe about God, who is mightiest in power, outstanding in beauty, immortal in life, and supreme in excellence, because though he is invisible to every mortal thing he is seen through his deeds. For it would be true to say that all the phenomena of the air, the land and the water are the works of the God who rules the cosmos; from whom, according to Empedocles the natural philosopher, grows all that is and was and is yet to come, the trees and the whole race of men and women, beasts, birds and water-nurtured fish.

Though it is rather a humble comparison, he is truly like the so-called "keystones" of vaults, which lie in the middle and by their junction with each side ensure the proper fit of the whole structure of the vault and preserve its arrangement and stability. They say too that the sculptor Pheidias, when he was making the Athena on the Acropolis, carved his own face into the middle of her shield, and by some hidden trick of craftsmanship attached it to the statue in such a way that if anyone tried to remove it he inevitably destroyed and demolished the whole statue. And this is the position held in the cosmos by God, who maintains the orderliness and preservation of the whole: except that he is not in the center—for here lies the Earth, this turbulent, troubled place—but high aloft, pure in a pure region, which we rightly call "heaven" (ouranos) because it forms the uppermost boundary [. . . ]. So also the same place is occupied by the most honored of perceptible things, the stars and the sun and the moon; and for this reason only the heavenly bodies always keep the same order and arrangement, and are never changed or altered; while the transient things on earth admit many alterations and conditions. [. . .]

In a word then, as the helmsman in his ship, as the charioteer in his chariot, as the leader in a chorus, as the lawgiver in a city, as the commander in a military camp, so is God in the cosmos, except that their command is wearisome and fraught with many movements and cares, while God rules without pain and toil, free from all bodily weakness: for he is established in the immovable, and moves and directs all things as
and where he wishes, among the varieties of form and nature; just as the law of the city, itself immovably established within the minds of those who observe it, disposes all the activities of the state: for in obedience to the law the magistrates go to their offices, the judges to their appropriate courts, the councillors and members of the assembly to their appointed meeting-places; and one man goes to the prytaneum for his meals, another to the law-courts to defend himself, a third to prison to die. [. . .] So it is, we must suppose, with that greater city, the cosmos: God is a law to us, impartial and admitting no correction or change; he is surely a stronger and more stable law than those inscribed on tablets. Under his motionless and harmonious guidance all the orderly arrangement of heaven and Earth is administered, extending over an things through the seed proper to their kind, to plants and animals by genus and species.