

## THE COSMOLOGY OF ARISTOTLE c.384-323 BC

### Nick Campion notes

Aristotle was Plato's pupil. Aristotle was Plato's pupil. He wrote extensively on astronomy and physics, chiefly enquiring into the reasons for motion. Book XII of the *Metaphysics*, is one of the most important passages. Others occur in the *Physics* and *De Caelo* (On the Heavens). Aristotle's celestial mechanics drew on work by Eudoxus of Cnidus (c.400-.c.355/350 BCE), a brilliant mathematician and associate of Plato, who tried to explain the fact, ignored by Plato, that the planets occasionally reverse their motions; he developed the model of concentric spheres by which the planets' motions could be both erratic, as physical observation demonstrated, and perfect circles, as Plato's theoretical mathematics required. His calendar of the rising and setting of constellations formed the basis for Aratus' *Phaenomena*. However Eudoxus' writings are lost and known mainly from a summary in Aristotle's *Metaphysics*.

Eudoxus' system of concentric spheres contained certain flaws. For example, it couldn't explain the planets' varying distances from the Earth, which seemed to be the likely cause of their varying brightness. Further work was therefore done by his pupil Polemarchus, and his pupil Callipus, who moved to Athens and collaborated with Aristotle. (The system of concentric spheres is set out in *Metaphysics* XII.1073-1074. Also see the diagram in *De Caelo*, trans. Guthrie, p. 208 and the explanations in *De Caelo* 292a – see also 268b-269b)

#### Comparison with Plato

Aristotle's cosmology has strong similarities with Plato's - such as his emphasis on circular motion as the most perfect sort of motion, and his belief that an absence of motion is equated with the 'good', or absolute perfection. Yet he was much more at home in the world of the physical senses than Plato and hence tended to replace Plato's other-worldliness with an interest in biology and real celestial mechanics (rather than theoretical mathematics). Whereas Plato's basic concept was that the essences which define things pre-exist any instances of the things themselves, and that the essence of "treeness" pre-exists any actual tree, Aristotle believed the exact opposite, that "treeness" can only occur in conjunction with actual trees.

#### Life

Aristotle's father was the personal physician to Amyntas II of Macedon. In 367 BCE, at the age of seventeen, Aristotle went to Athens to study at Plato's Academy and stayed there for twenty years. He left in 347 after the political situation changed (Athens was now Macedon's main rival) and Plato's nephew took over the Academy. He moved to Asia Minor, married the daughter of the local ruler and founded a new Academy. In 344 he moved to Lesbos, where he worked with Theophrastus, and in 342 he returned to Macedon to tutor the future Alexander the Great. After Philip II of Macedon completed his conquest of Greece in 338 Aristotle found himself in an influential position and, after Alexander succeeded in 336, he returned to Athens on the side of the victors. When Alexander died in 323, Aristotle went into voluntary exile in Chalcis in Euboea, and died in 322.

#### Astrology

Aristotle never made any direct reference to astrology in spite of the fact that he must have been well aware of it. However, medieval tradition often erroneously pictured Aristotle as an astrologer, even as Alexander the Great's astrologer. In fact Alexander and Aristotle remained on excellent terms and, when Alexander conquered Babylon in 331, he sent Aristotle copies of Babylonian eclipse records.

There actually were a large number of spurious works in the Middle Ages on both Alchemy and Astrology attributed to Aristotle. Notable among these was the so-called *Liber Aristotilis* (Book of Aristotle) on Astrology compiled by one Hugo of Santalla. The *Secreta Secretorum* (Secret of Secrets) purported to be Aristotle's advice to Alexander on kingship, including advice on the use of astrology, and was seen as a guide to model behaviour of medieval monarchs.

### **The divinity of the planets**

Aristotle denied that the stars and planets were gods (*Metaphysics* XII.1074b). However, he did say that they are living beings:

'The fact is that we are inclined to think of the stars as mere bodies or units, occurring in a certain order but completely lifeless; whereas we ought to think of them as partaking of life and initiative. Once we do this, the events will no longer be surprising' (*On the Heavens* II.xii.292a).

### **The matter of the universe**

Following Empedocles (c.495 BCE) and Plato, Aristotle believed that the universe is comprised of four elements, fire, air, water and earth, but ascribed all physical motion to a fifth element, aither (sometimes spelled aether) which, he argued, does not exist on Earth, only in the heavens (aither was already used by Anaxagoras and Parmenides, see Kirk, 259. 372-4)

...four bodies are fire, air, water, earth." (*Meteorologica* 339a15-16)

The whole terrestrial region then is compounded of these four bodies and it is the conditions which affect them which, we have said, are the subject of our inquiry. This region must be continuous with the motions of the heavens, which therefore regulate its whole capacity for movement. For the celestial element as source of all motion, must be regarded as first cause (*Meteorologica* 339a19-24).

Fire, air, water, earth, we assert, originate from one another, and each of them exists potentially in each, as all things do that can be resolved into a common and ultimate substrate." (*Meteorologica* 339a36-b2)

### **Causality**

Aristotle's theory of causation is set out in the *Physics* 194b-195a, with additional comment in *Metaphysics* 995b-996a.

The use of the English word 'cause' to translate Aristotle's *aitia* is the source of some dispute. Francis Cornford and Philip Wicksteed, the translators of the authoritative modern edition claim extravagantly that its use does violence to the English. 1 *Aitia* is derived from the adjective *aitios*, meaning 'responsible', so the causes which Aristotle outlines are those things which are responsible for the condition of any object. The idea of responsibility adds an additional slant to the often one-dimensional word cause: a cause not just the action which causes something to move, like a billiard cue hitting a ball, but the thing which has responsibility for the world. Aristotle's theory of causes enriches our understanding of the way

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1 Francis Cornford and Philip Wicksteed on Aristotle, *Physics*, 2 Vols, trans. F.M.Cornford and P.H.Wickstead, Cambridge Mass., London, 1930., Vol. 1. pp. 126-7

the world works, replacing the modern linear world with a much richer, multidimensional conception of the relationship between time and space.

The passage in which Aristotle outlines his causes is remarkably brief, considering the length and general wordiness of his work, consisting of around 300 words.

Aristotle classified causes into four categories which he believed could answer the 'why' of an object's existence. All four causes may act simultaneously:

1. material - the matter from which an object is made (i.e., fire belongs in heaven, therefore flames, made of fire go up: all the elements find their own place, fire at the top, then air, water, and earth at the bottom)
2. formal - is sometimes described as shape. However it can be similar to the Ideal Forms in Plato's cosmology. The form is the essential nature of a thing, i.e., what it is. It is the same functionally as a Platonic Idea except that it does not exist independently of or prior to an actual instance of something.
3. efficient - the object's maker
4. final - the object's use or purpose (all activities have a purpose and all objects are becoming something else. Thus a person walks because s/he wants to be healthy. Also, what an object can become is restricted by its nature: an acorn must become an oak tree, not a cabbage. There can be an overlap with material causes: fire goes up because its purpose is to return to its natural place - in heaven).

(At this point I'd like to note an example of Aristotelian thought in modern astrology - from Liz Greene's 'Astrology for Lovers', p. 119: 'Being born under a particular sign, or having a lot of planets or the ascendant placed there, doesn't automatically show that you are those things, that you have those qualities full-blown and ready to display in the shop window. It means that there is a reservoir of potential innate in you, something to strive toward. You grow into your chart, just as a seed grows into a full plant'. That sounds like a description of the 'final cause'.)

### **Influence**

According to Aristotle influence was divided into three categories:

1. celestial motions (*motus*) transmitting light and heat,
2. celestial light (*lumen*) producing day and night,
3. *influentiae*, intended to explain otherwise inexplicable phenomena, such as the formation of metals in the earth, magnetism and the tides.

### **The Prime Mover**

Aristotle talks of the creator, God, as the Prime Mover, the being who initiates all motion and hence creation. Sometimes this is referred to as the 'Unmoved Mover. See *Metaphysics* XII.vii.17-18. Crucially for later Aristotelians, the planets are then the secondary causes: the Persian commentator al-Ghazali (c. 1058 – 1111) wrote:

When they [people] hear that certain effects follow the motion of planets, it occurs to them that it is the planets that influence and effect [the course of events], and that they are the organising deities [...] As a result, they [the planets] become venerated [by people], and

their [the people's] hearts become attached to them [the planets], believing that good and evil are be either sought or feared from them [the planets].<sup>2</sup>

### Birth and destiny

In the Republic Book 1, v, 1254a17 (p. 67 Penguin Classic, trans T.A.Sinclair), Aristotle is discussing the effect of birth on social and political status: 'That one should command and another obey is both necessary and expedient. Indeed some things are so divided right from birth, some to rule, some to be ruled'.

### Aristotle on The Soul Nick Campion

According to some commentators the development of Aristotle's psychological theory falls into three main stages.[1]

1. Platonic stage evident in *Eudemus*: as in Plato's *Phaedo* the soul = an unwilling prisoner on the body
2. Instrumentalism. The soul was still spiritual substance (like Plato), not inherently connected to the body to which it was attached, and the body was the soul's instrument rather than it's prison.
3. Entelechism - *De Anima*:

Entelechy

1. In the philosophy of Aristotle, the condition of a thing whose essence is fully realized; actuality.
2. In some philosophical systems, a vital force that directs an organism toward self-fulfillment.

[Late Latin entelecha, from Greek entelekheia : entels, complete (en-, in; see en-2 + telos, completion; see kwel-1 in Indo-European roots) + ekhein, to have; see segh- in Indo-European roots.]

From *De Anima* (*On the Soul*)

II.I (412a) (see also II.II 414a) One class of things is described as substance

This is divided into three:

- i. matter (not individual) = potential (see also II.V417b)
- ii. shape or form (provides individuality) = realisation or actuality. (Form is a translation of *eidos* - idea)
- iii. compound of the two.

'Soul is substance in the sense of being the form of a natural body, which potentially has life. And substance in this sense is actuality. The soul, then, is the actuality of the kind of body we have described'.[2]

II.I (412a-b) Actuality is then divided into two analagous to the possession of knowledge and to

- a) sleep
- b) waking

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<sup>2</sup> al-Ghazālī, *Revival of the Religious Sciences*, I:44; on al-Ghazālī's attack on the Aristotelian philosophy of secondary causes see al-Ghazālī, *Deliverance from Error*, pp.83-84 (NICK: WITH MY THANKS TO MAI LOOTAH (M.A. RASHED))

II.II (413a-b) The soul is the origin of the characteristics of life: the faculties of (i) nutrition, (ii) sensation, (iii) thought and (iv) movement.

II.II.(413b) Although the parts of the soul cannot be separated, the 'mind and the thinking faculty' may be a distinct kind of soul, which can be separated from the perishable (i.e., body) and may be immortal.

II.II 414a. The soul is the actuality of a body. (i.e. the soul provides individuality).

The body can not be the actuality of a soul.

The soul is not a body but it (a) cannot exist without a body (b) is associated with a body and (c) resides in a body.

While the other parts of the soul may not be separated, they are 'theoretically different'. Sensation, opinion and feeling are clearly different

II.III 414a-b The faculties (or senses - II.IV.415b) of the soul are

a) Nutritive (possessed by plants, animals and people) (see also II.IV.416a-b)

b) Sensation (includes touch, which allows perception of flavour, includes pleasure (stimulates desire), pain), appetite (includes desire (includes hunger, thirst), inclination, wish) (animals), power of movement in space (possessed by animals, people) (see also II.V.416b-417a). (Sensation is of particulars II.V.417b)

c) Thinking, intelligence (possessed by people). (Knowledge is of universals II.V.417b)

II.III 415b Asserts that there must be a common definition of soul but rejects the idea.

II.III 414b-415a The faculties of the soul are arranged in a series, a allows b and b allows c, like geometrical figures (cf Plato)

II.IV 415a. Yet thinking and perceiving must precede the other faculties

II.IV.415b. 'The soul is the cause and first principle of the living body'

The soul is the cause of the three senses/faculties in the sense of

a) the cause of that from which motion is derived.

b) the cause of the purpose of final cause (i.e., that to which they are heading towards in the fulfilment of their potential: both mind and nature has purpose)

c) the cause of the substance of all bodies that have souls

III.III Imagination

## **The Active Intellect**

III.V.430a

Divides the intellect into two (NB this is one of his most important teachings for medieval astrology):

1. Passive. 'Becomes all things', i.e. is undifferentiated potential.

2. Active (This does not appear to be Aristotle's term, but that of later commentators. See for example Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, p. 204.

Aristotle calls it an 'activity'): separable, impassive, unmixed (i.e. exists by itself without mixing with other faculties) and immortal, everlasting (see also I.IV.408b: 'the mind is something more divine and is unaffected').

‘Mind in the passive sense is such because it becomes all things, but mind has another aspect in that it makes all things; this is a kind of positive state like light; for in a sense light makes potential into actual colours. Mind in this sense is separable, impassive and unmixed, since it is essentially an activity; for the agent is always superior to the patient, and the origination cause to the matter...When isolated it is its true self and nothing more, and this alone is immortal and everlasting...and without this nothing thinks’.<sup>3</sup>

This passage has been a source of considerable confusion since classical times, because nobody can agree on what Aristotle actually meant. So far the uncertainty has lasted for well over two thousand years. As Hugh Lawson-Tancred wrote of what he calls this ‘notorious’ theory, ‘Perhaps the most serious objection, however, to this chapter is that the distinction being drawn here is otiose within the general structure of the theory’.<sup>4</sup> Elsewhere he calls Aristotle’s theory ‘notorious’. It would be far simpler to take Aristotle at his word and assume that he meant that there is a part of the soul which survives physical death.

III.IX, 432a-b. Discusses whether soul can be divided into parts. Decides it can not because the different faculties exist at different levels.

### **The Soul: Aristotle and other philosophers**

Book I

I.II Rejects Pythagorean idea that the soul is a ‘harmony’, adjusting the other parts of the world.

I.V 411a. Rejects Platonic view that the soul pervades the universe.

### **The Soul: Lawson-Tancred’s commentary:**

‘The psyche, for Aristotle, is that in virtue of which something is alive. The most accurate translation of the term into English would be “principle of life” or “principle of animation”’.[3]

Can we read Aristotle as suggesting that soul is Form[4] (i.e., the Form of a human being?). Or is this too Platonic, and is it better to say that the soul is receptive to Form, without itself being Form?[5]

If we see Aristotle as suggesting a ‘necessary structural Parallelism between soul and body’, and if Form and Matter are closely connected, Tancred-Lawson asks, ‘is he not directly anticipating the Physicalist theories so dominant in contemporary philosophy of psychology?’[6]

### **Consequences of Aristotle's work for astrology**

Aristotle never mentioned astrology, subsequent writers were able to draw conclusions from his work which were either favourable to astrology or hostile to it.

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3 Aristotle, *On the Soul*, trans. W.S.Hett (Cambridge Mass., London: Harvard University Press, 1936), III.V

4 Hugh Lawson-Tancred in Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, pp. 46, 204

### 1. For

- a. the stars and planets are secondary causes and hence any study of why things happen must take them into account.
- b. the planets are active and alive.
- c. the cosmos is a single whole - humans, stars and planets are all part of the same integrated system, made of the same substance.
- d. in order to encounter/return to God, humans must travel through the planetary spheres.
- e. Aristotle's interest in biology and gestation may, like Plato's interest in better and worse births, have been a factor in the later development of natal astrology, a point which requires further investigation.

### 2. Against

- a. by emphasising natural causes, Aristotle undermined the planetary deities of Babylonian astrology.
- b. like Plato, the belief that stars and planets moved in precise, mathematically defined orbits, also undermined Babylonian astrology (although the same dilemma existed within Babylonian astrology - but was never addressed).
- c. the planets were no longer divinities.
- d. Aristotle's thought tended to be sceptical and demand mathematical and logical proofs which astrology was unable to supply.

### Aristotle's historical significance

Aristotle's historical influence was huge. His major impact on astrology was felt through Claudius Ptolemy, whose *Tetrabiblos* (c.120 CE) was to become perhaps the most important astrological textbook in the west. Ptolemy removed all divine and mythological causes from astrology and was the first astrologer we know of to put forward the naturalistic rationale for astrology, namely that if the moon pulls the tides then it, and the other planets, must similarly exert an influence on humanity. This represents a decisive shift within astrology away from an astrology of deities and souls to one of physical influences. The *Tetrabiblos* was one of many texts used by the astrologers of the Islamic world from the ninth century onwards, and its importance in western astrology became entrenched when, in 1138, it became the first major classical astrology text to be translated from Arabic into Latin. This translation was part of a wave of translations of Arabic material, including a very large proportion of Aristotle's work. It was believed that Aristotle sanctioned astrology and, as we shall discover in term 2, the introduction of astrology into medieval thought was part of a wider intellectual and cultural revolution which has become known as the 'Twelfth Century Renaissance'. Aristotelian cosmology dominated European astronomy until the astronomical revolution of the sixteenth- and seventeenth-centuries. Within astrology we might see the Aristotelian strand as currently represented by efforts to prove astrology statistically or investigate possible physical relationships between humanity and the planets.

Aristotle, *On the Soul*, trans. W.S.Hett (Cambridge Mass., London: Harvard University Press, 1936).

Aristotle, *Physics*, 2 Vols, trans. F.M.Cornford and P.H.Wickstead, Cambridge Mass., London, 1930.

Aristotle, *Meteorologica*, trans. H.D.P.Lee, Cambridge Mass., London: Harvard University Press, 1937.

Aristotle, *Metaphysics*, 2 Vols, Vol. 1 trans. Hugh Tredennick, Vol. 2 trans. Hugh Tredennick and G.Cyril Armstrong, Cambridge Mass., London, 1933.

Aristotle, *Athenian Constitution*, trans. H.Rackham, Cambridge Mass., London, 1931.

Aristotle, *On the Heavens* (De Caelo), trans. W.K.C.Guthrie, Cambridge Mass., London, 1921.

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[1] Lawson-Tancred, Hugh, 'Introduction' in Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, pp. 54-5.

[2] Aristotle, *On the Soul*, trans. W.S.Hett, Cambridge Mass., London: Harvard University Press, 1936, II.1 (412a).

[3] Lawson-Tancred, Hugh, 'Introduction' in Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, p. 12.

[4] Lawson-Tancred, Hugh, 'Introduction' in Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, p. 15.

[5] Lawson-Tancred, Hugh, 'Introduction' in Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, p. 53.

[6] Lawson-Tancred, Hugh, 'Introduction' in Aristotle, *De Anima*, trans. Hugh Lawson-Tancred, London: Penguin, 1986, p. 37.