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ARISTOTLE'S MANY LIVES

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Abstract

Distinctively, Aristotle denies that there is a univocal definition of life, but he still offers an account of how the many different ways of being alive are related. In particular, more advanced forms of life potentially contain less advanced forms of life in them. In this paper, I defend this interpretation of Aristotle against other recent interpreters. I also set out Aristotle's account of the most general life-activity – nutrition – and show how his account doesn't fall prey to the objection that it is parochial.

Keywords

Aristotle • De Anima • on the soul • definition of life

Aristotle on life

Before even looking at Aristotle's definition of what life is, there are good reasons to assume at the outset that he will have something worthwhile to tell us. First, Aristotle had a systematic philosophical outlook in which his biology formed a coherent part with his more basic natural and metaphysical principles. Second, Aristotle engaged in a remarkably extensive observation of animals, both detailing their activities in their habitats and conducting dissections on some of them. Third, Aristotle consciously tested his general principles against these observed facts to ensure that he had empirically adequate theories of the facts he sought to explain. At the same time, there is no consensus in contemporary biology about what the definition of life is, and so there is a gap here which Aristotle can sensibly be brought in to.[1]

One hindrance modern scientifically-minded readers may have when reading Aristotle's principal work concerning what life is is that his discussion is couched in terms of the 'soul' (Greek: *psuchē*; Latin: *anima*). In this work, the *De Anima* (*On the Soul*), Aristotle conducts a systematic investigation into what the soul is. It is important for one to understand this work that one appreciate Aristotle's intentions. The Greek term '*psuchē*' is not a philosophical term of art, but it has deep resonances in Greek culture, which one can see in its frequent use in Homer.[2] By the 4th century B.C., the term had come to refer to a certain principle of life, a kind of animating principle in all sorts of living beings and not just humans.[3] Hence, when Aristotle investigates what the soul is – how one can give a properly explanatory definition characterizing it – he is searching for what it is that explains what makes certain beings alive and others not.

Given this background, it is open at the outset of Aristotle's inquiry that the soul might turn out to be some completely physical entity. For instance, Aristotle considers definitions of the soul given by his philosophical predecessors which define the soul as either a particular material element (e.g., Democritus' fire atoms) or a ratio among material elements (the '*harmonia*' theory). This means that it is a mistake to think Aristotle begs the question against materialism when he assumes that souls exist and seeks to discover what they are. Likewise, it is a mistake to think that when Aristotle speaks of souls, he means something like a mind. Rather, one innovation in Aristotle's theory of the soul is his claim that even plants have souls.[4] Going further, one can say that

1 Cleland (2) presents and critiques several of these definitions. Even NASA's working definition of life is the subject of criticism and revision. For instance, see Cleland and Chyba (1), van Heteren (4), Vitas and Dobovišek (6), Gomez-Marquez (3), and Malaterre (5).

2 See Lorenz (7) for a discussion of the semantic range of '*psuchē*' in 4th-century B.C. Greek and before.

3 Indeed, one of Aristotle's innovations is extending the range of living beings which have souls to include not merely non-rational animals but also plants. Hence, *mentality* is not a requirement for having a soul because Aristotle is quite clear that plants lack any form of perceptual awareness.

4 Falcon (8).

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were Aristotle made aware of prokaryotic microorganisms like bacteria, he would ascribe souls to them categorically without thinking this entailed anything about their having a form of mental awareness.

In what follows, I will be concerned primarily with explaining how Aristotle went about defining what life was rather than with the further question of whether these explanations are still valid or how they would apply to putative forms of life discovered well after Aristotle's time (e.g., the whole realm of microorganisms). This more exegetical task is its own effort, given the subtleties of Aristotle's views about how to define life. The difficulties of interpretation are twofold on this issue. First, Aristotle doesn't simply give a list of necessary and sufficient conditions for being alive but provides a causal analysis of the functions common to all living things. Second, Aristotle really has two distinct questions when it comes to defining life. As we will see, this is because he thinks that the different manifestations of life in living things of more or less complexity prevent a single definition of life in general. Instead, Aristotle provides a hierarchical account of what life is based on the serial ordering among different kinds of life, which forms the basis of his entire theoretical investigation into what the soul is in the *De Anima*.

In this article, I set out these two distinct questions Aristotle has concerning the definition of life in my section titled "The two basic questions": what functions do all living things share in common, and what makes a given individual of some species S alive? Then, in the next section, I consider Aristotle's answer to the first of these questions by presenting his account of what nutrition is. In the section titled "Different forms of life and soul", I present Aristotle's reasoning for denying that what makes any given organism alive will be the same for every kind of organism. Crucially, Aristotle denies that one can give a univocal definition of life or soul insofar as the different kinds of lives and souls are ordered serially. Then in the section titled "Explaining the series", I show how Aristotle goes about explaining this serial ordering of lives and souls (e.g., why is it that everything which has the distance senses also has the ability to move itself in space?). In the final section, I take up an objection (what I call the 'parochialism objection') to the kind of organic definition of life I give in the article.

The two basic questions

We need to clearly distinguish between two basic questions Aristotle is interested in when it comes to what life is:

> First, what functions are common to all living things insofar as they are alive?
>
> Second, what is it for this particular organism of species *S* to be alive?

The first question is the one biologists and philosophers of biology are generally interested in when they seek to define what life is. The debate here consists in providing rival sets of necessary and sufficient conditions for what it is for anything to be alive. Aristotle answers this question by giving us a set of three functions in which all living things engage: nutrition, growth, and generation.[5] The main problem interpreters have had with Aristotle's answer to this question has been whether he successfully gives a non-circular definition of these functions. In particular, can Aristotle define nutrition without defining it as a type of process that things which have life engage in? In the next section, I will consider this objection and show how Aristotle can give a non-circular definition of nutrition but only because he doesn't ultimately define souls in terms of lives (but rather the other way around).

For Aristotle, the second question also bears on what it is for something to be alive because as he shows, one cannot give a successful univocal definition of life in general. This is because lives (and souls) are ordered sequentially such that higher forms of life include lower forms of life within them. Hence, e.g., the life of an animal will include not only perception but also functions like nutrition and generation. This sequential ordering makes it impossible to give a generic definition of life or soul because such a definition would omit essential information about the ways different kinds of lives and souls are formed out of each other.

The common life functions

In this section, I consider the first basic question: which functions are common to all living things insofar as they are alive? In *De Anima* Book II Chapter 4, Aristotle considers this question in the context of his investigation of that part of the soul which is had by every living thing – what he calls the 'nutritive part'.[6] To define any part of the soul, Aristotle says one must define the activity of this part of the soul, and to define this activity, one must define the objects of this activity. Hence, Aristotle sets out the following order of inquiry: (i) objects, (ii) activities, (iii) parts. In the case of the nutritive part, Aristotle must investigate the object of a living being's activity of nourishing itself in order to specify what the nutritive part is.

5 In fact, Aristotle doesn't require that everything be able to engage in generation in order to be alive, but he specifies the exceptions to this generalization.
6 *De Anima* II.4.

When it comes to defining what nutrition is, we need to keep in mind what Aristotle thinks a successful definition will consist in: a definition which explains the *definiendum* in virtue of its causes.[7] For instance, a successful definition of thunder will define it as a sound in the clouds which is caused by the rapid expansion of air along the path of lightning. A definition of thunder as simply 'sound in the clouds' will be inadequate, since one does not understand what thunder is until one understands what actually causes it. Famously, Aristotle analyzes four distinct modes of causation: formal, material, final, and efficient.[8] In his account of nutrition, Aristotle defines this process in virtue of its four causes.

In particular, he specifies what it is which is the subject of nutrition (the material cause), what is the agent of nutrition and the instrument it uses to effect nutrition (the efficient cause), and the good which nutrition is oriented by its nature towards achieving (the final cause). Interestingly, Aristotle doesn't specify the formal cause of nutrition, i.e., what kind of change nutrition is. However, one might suppose that the related process of perception, which is identified as a kind of alteration, will be of the same kind as nutrition.[9]

The efficient and material causes of nutrition

In this passage, Aristotle specifies the material and efficient cause of the activity of nutrition:

> Seeing that there are three things, *what is nourished*, *what it is nourished by*, and *what nourishes*, *what nourishes* is the primary soul, *what is nourished* is the body that has it [i.e., the body that has the primary soul], and *what it is nourished by* is the nourishment. (But since it is right to address everything based on the end, and generating one of the same sort as itself is an end, the primary soul would be one generative of one of the same sort as itself.)[10] But *what it is nourished by* is twofold, just like what a ship is steered by, namely, the hand and the rudder – the one causing movement and being moved, the other being moved only. For all nourishment must be capable of being concocted, and what effects the concoction is heat, which is why every ensouled thing has heat.[11]

Aristotle's distinction between 'three things' involved in this activity is based on his discussion of motion in general in *Physics* VIII.5 where he distinguishes between the primary mover, the instrument(s) by which the primary mover moves something, and that which is ultimately moved. The primary mover moves something without itself being moved, while the instruments move something insofar as they are themselves moved by the primary mover. It is tempting to think of this as a way of describing two discrete processes (i.e., the primary mover moves the instruments and the instruments in turn move some other object), but this is exactly what Aristotle wants to avoid. It is rather that the action of the instruments is only the kind of action it is in virtue of being the way the primary mover acts on what is ultimately moved. Aristotle's discussion is relevant in our *De Anima* passage because it indicates the unity of the process by which the soul uses the vital heat of the body and the nourishment it receives to actually nourish the body.[12]

The final cause of nutrition

In this passage, Aristotle specifies the final cause of the activity of nutrition, distinguishing it at the same time from the activities of growth and generation:

> But since nothing is nourished that does not partake in soul, what is nourished will be the ensouled body, insofar as it is ensouled, so that nourishment is also relative to an ensouled being – and not accidentally so. The being for nourishment, however, is distinct from the being for a growth-producer. For it

7 Aristotle (22), *Posterior Analytics* B.8-11. See Charles (9), especially Chapter 2, for an exposition of this challenging set of chapters.

8 Aristotle (17), *Physics* II.3.

9 Charles (10) shows the relevant similarity between perception and nutrition to establish this point (pp. 130–133). Typically, Aristotle characterizes alteration as a change in the qualities of a substance, e.g., a change in temperature or hardness or color. Aristotle takes perception to be a different kind of alteration, since in the case of perception there is no loss of one quality and gaining of another but only a transition from inactivity to activity. Likewise, nutrition will not involve the loss of any quality by the organism but only a transition to its actively nourishing itself.

10 This parenthetical remark is often moved elsewhere by editors because it seems to be irrelevant to the context, but its presence here is intelligible. Aristotle speaks about the 'primary soul' because this soul is potentially present in the other kinds of souls (see next section and *De Anima* II.3), but it can be more perspicuously named the 'generative soul' rather than the 'nutritive' or 'growth-producing soul' because generation is the end of these other processes. The teleological connection between these processes is frequently commented upon by interpreters, but see Gelber (11) for the further point that the processes of nutrition and growth are really just stages in an overarching process whose final stage is generation. How exactly Gelber understands how one process can be a stage in an overarching process is somewhat unclear, but a plausible way to take the suggestion is that it is essential to the process of generation that it be efficiently caused by the process of nutrition and that the gametes with which it operates be themselves the results of the nutritive process, and likewise it is essential to nutrition that it be directed towards this generative process.

11 Aristotle (18), *De Anima* II.4 416b20-30, trans. C.D.C. Reeve (with minor modifications). See also Aristotle (19), trans. Christopher Shields, and Aristotle (20), ed. and trans. Klaus Corcilius.

12 Aristotle speaks of two instruments: the nourishment and the vital heat. Vital heat is an important part of Aristotle's biological theory because it is this vital heat (the maintenance of which corresponds to our concept of *homeostasis*) which performs a number of biochemical processes in the living body. E.g., as here, it is the concoction performed by this vital heat, which changes food coming into the body into a suitable form to actually be used by the body for its activities.

> is growth-producing insofar as the ensouled thing is a certain quantity, whereas it is nourishment insofar as the ensouled being is a *this something* [*tode ti*] and a substance [*ousia*]. For the nourishment preserves the substance and the substance exists just as long as it is nourished, and nourishment is generative not of what is being nourished, but of something of the same sort as what is being nourished. For the substance of the body being nourished already exists, and nothing generates itself, but rather preserves itself. So, this sort of starting-point of the soul is a capacity of the sort that preserves what has it, insofar as it is ensouled, and nourishment equips it to be active. That is why, if deprived of food it cannot exist.[13]

Here Aristotle is characterizing the ways in which one and the same edible object coming into the body can be alternately (i) *nutritive* (ii) *growth-producing* or (iii) *generative*, depending on whether this object is used to act on the living body (i) insofar as that body is a substance and hence is used to preserve that body in being or (ii) insofar as that body is of certain dimensions and hence is used to increase those dimensions or (iii) insofar as that body is of a certain species and hence is used to generate another of that same species.

What it is to be nourishment then is to be an instrument that the soul uses for the end of preserving the ensouled body, enabling it to be active. But is that all there is to being nourishment? I think not, since Aristotle's only intention in this passage is to distinguish how this one and the same object can be *nutritive* or *growth-producing* or *generation-enabling*, depending on what the soul uses it for. Yet in order to be any of these, this object needs to have undergone the biochemical process of concoction, and having undergone this process seems to be essential to anything's being nourishment.[14]

The circularity objection

At this point, I want to engage with a criticism interpreters often make of Aristotle's account of nutrition: one cannot define life in terms of nutritive activity because Aristotle defines nutritive activity in terms of what's alive.[15] Hence, Aristotle can only give a circular definition of life. The objector says the following: 'What distinguishes the activities of a fire's being fed more wood and an organism's being fed? The only relevant distinction is that organisms are alive and fires aren't. Hence, one will have to define the kind of feeding organisms engage in as an activity living things engage in. That means we can't then define being alive in terms of engaging in nutritive activity.'

To respond to this objection, we have to keep in mind Aristotle's distinction between two ways of being more knowable: what is more knowable relative to us and what is more knowable relative to nature.[16] Greater knowability relative to us means what is better known at the outset of our inquiry, generally what is apparent to us through observation. Greater knowability relative to nature means what is really more fundamental and which causally explains more posterior facts. Hence, that tuberculosis impairs one's breathing is more knowable relative to us, insofar as it is something more readily discovered through observation. However, that a microorganism *Mycobacterium tuberculosis* causes tuberculosis is more knowable relative to nature because it is what explains the effects of the disease. Hence, the entire project of science is just using what is more knowable relative to us to discover what is more knowable relative to nature and then to explain using these more fundamental facts that which is more obvious to us.

In the case of life and the soul, we need to recognize that life is more knowable relative to us, whereas the soul – the principle whereby something is alive – is more knowable relative to nature. It is the soul that explains why something is alive. Hence, when Aristotle defines nutrition in terms of the activity of the soul on an ensouled body, this is compatible with his thinking that one can then define life in terms of nutrition. For even though being ensouled and being alive are coextensive, a substance's being ensouled is what explains its being alive.

Different forms of life and soul

In this section, I present Aristotle's reasons for denying the possibility of a univocal definition of life in *De Anima* II.3. I consider two rival proposals for how Aristotle thinks the different forms of life are related and show the problems for each.

In one of Aristotle's logical works–the *Topics*–Aristotle uses the definition of life as an example. In particular, he considers

13 *De Anima* II.4 416b9-20, trans. CDC Reeve (with significant modifications).

14 This is controversial, but there are two reasons for thinking this. First, it would explain why Aristotle takes it to be universally true that all nourishment is capable of being concocted (416b28-29). If it were essential to being nourishment that something actually undergo the process of concoction, this would explain why this process was the only one by which nourishment could arise. Second, one can appeal to Aristotle's account in *De Anima* I.1 of what an appropriate definition of anger and other activities of the living thing should be like. Just as one should specify the hormonal processes which are essential to anger, one should specify the biochemical processes which are essential to nutrition. This interpretation is in line with Charles (10)'s inextricabilist interpretation of the *De Anima*.

15 See e.g., Shields (12), pp. 180-181.

16 *Physics* I.1.

what's wrong with another philosopher's definition of life:

> This occurred also with Dionysius's definition of life, if indeed this is 'movement of a creature which is nourished, when it <viz. this movement> is naturally present within it'. This belongs to animals no more than to plants. But life seems not to be spoken of according to one form, but belongs in one way to animals and in another way to plants.[17]

Dionysius' definition of life might strike us as quite plausible at first, and Aristotle's complaint seems rather bizarre. Surely, a good definition of life would apply equally well to plants and animals. Yet Aristotle takes it here as a given that there is not just one way of being alive but rather there are different forms of life. That, on its own, is indisputable, but why take that to rule out a univocal definition of life? Aristotle will explain in *De Anima* II.3 after he has given his definition of the soul.

Aristotle on univocity

Before getting into Aristotle's rejection of the possibility of a univocal definition of soul, I should summarize his basic account of univocity and equivocity (also called 'synonymy' and 'homonymy' from the Greek terms). In the *Categories* Chapter 1, Aristotle characterizes two things as univocal (synonymous) in virtue of their having both a name and the definition [*logos*] specifying the essence [*ousia*] denominated by that name in common. Two things are equivocal (homonymous) in virtue of their having only their name in common, while the definitions specifying the essence denominated by that name are different.

Some distinctive features of Aristotle's account of univocity stand out. He is describing a relation between actual things in the world rather than words or concepts, but this relation obtains between these actual things on the basis of both linguistic and metaphysical facts. So, dogs and cats are synonymous in virtue of their having a name in common (i.e., 'mammal') and this name's having the same essence-specifying definition in each case, i.e., a cat is a mammal in virtue of being an animal which belongs to a species that produces milk just as a dog is a mammal in virtue of being an animal which belongs to a species that produces milk. On the other hand, even though the arms on one's body and the arms one uses in war have a name in common (i.e., 'arms'), the essence-specifying definition for each will be different. In the one case, some things are arms in virtue of being a kind of limb for an animal, while in the other, some things are arms in virtue of being weapons. As we will see in Aristotle's discussion of souls and lives, the relation between equivocal (homonymous) terms is often closer than that between the two kinds of arms. In other words, equivocity is compatible with there being a non-accidental relation between two items, but what it doesn't allow is for there to be a complete overlap in their essence-specifying definitions in relation to the name they share in common.[18]

Rejecting univocity for souls and lives

Aristotle's rejection of a univocal definition of souls and lives is based on (i) the similarity between how different kinds of geometrical figures are related to each other and how different kinds of souls are related to each other and (ii) the impossibility of giving a univocal definition of geometrical figures.

> It is clear, then, that there could be a single account of soul in the same way as there is of figure. For in the latter case there is no figure beyond the triangle and the others that are next in sequential order, and in the former there is no soul beyond the ones we mentioned. In the case of the figures, though, we could produce a common account, which would fit them all and be special to no figure. Likewise, too in the case of the souls we mentioned. That is why it is ridiculous to inquire after a common account both in these cases and in others, when it is an account that will not be special to any being, and will not accord with its proper indivisible species, to the neglect of the one that is of this sort.[19]

At first glance, one might wrongly take Aristotle to be making a point familiar from his metaphysics of species and genus: no genus can exist independently of the species which specify it. It is not possible for something to exist as an animal without existing as some particular species of animal. In contemporary metaphysics, one might say that the genus is a determinable which only exists insofar as it is determined to a certain species. Yet the comparison with figures suggests that this is not the point Aristotle is making. Rather what is distinctive about both geometrical figures and souls (and numbers too) is that there are priority and posteriority relations among the different kinds. While there are clearly priority and posteriority relations between the species in relation to the genus, there are no such priority relations among the species themselves. In particular, when defining a dog, one must define it in terms of its genus, and in order for the genus animal to exist, some member of a species of animal must exist.[20] However, when

17 *Topics* 148a26-31, trans. Christopher Shields, in Shields (12), p. 178.

18 For further discussion of univocity in Aristotle, see Shields (12).

19 *De Anima* II.3 41420-29, trans. CDC Reeve (with minor modifications).

20 I am here using the terms 'species' and 'genus' in line with Aristotle's usage and not contemporary taxonomical practice. For Aristotle, these terms are correlative with each other such that at

defining a pentagon, one must define it not in terms of a genus but in terms of how it is constructed – which construction will itself depend on the construction of triangles.[21] So, in Euclid's *Elements*, the theorem for inscribing a pentagon in a given circle requires one to construct triangles (Book IV, Proposition 11). While the definition of the triangle is among Euclid's axioms, other figures like pentagons and hexagons he constructs in the course of his theorems. Indeed, it is critical that he proceed this way to actually demonstrate the various properties of these figures.[22]

Christopher Frey gives the following argument to show why souls can't belong to a single genus given that they are ordered by priority relations:

1. A genus can exist even if any one given species under it does not exist.
2. A genus cannot exist if none of the species under it exist.[23]
3. The first member in an ordered series can exist even if none of the posterior members exist.
4. None of the posterior members in an ordered series can exist if the first member in an ordered series does not exist.
5. Assume (for *reductio*) that there is a genus of the members in an ordered series.
6. If there is a genus of the members of an ordered series, then the genus would exist even if the first member did not exist. (From 1)
7. Therefore, if there is a genus of the members of an ordered series, then the genus would exist even if neither the first nor the posterior members existed. (From 4, 6)
8. Therefore, if there is a genus of the members of an ordered series, then a genus can exist even if none of the species under it exist. (From 7)
9. Therefore, a genus can exist even if none of the species under it exist. (From 5, 8)
10. Contradiction[24] (From 2, 9)

Frey's argument is based on a modal claim about the possibility of the first member of a series existing without the other members in this series. Aristotle's point seems to go further than this because it is not merely that souls with only the nutritive power can exist even without the other powers but that it is essential to the higher kinds of souls that they have such a nutritive power.[25]

In the passage that follows, Aristotle makes these priority relations among different kinds of figures and souls explicit:

> For the situation as regards the soul is quite similar to the one where the figures are concerned. For what is prior is always potentially present in what is next in order, both in the case of the figures and in the case of the animate things – for example, the triangle in the quadrilateral, and the nutritive part in the perceptual one. So, we must inquire as regards each given case what the soul of each given one is – for example, what that of a plant is and that of a human or a beast.[26]

As we will see in the next section, it is critical that one recognize how more advanced souls potentially contain more primitive souls inside of them, i.e., the powers of these more primitive souls are possessed by whatever has the more advanced souls. If one doesn't recognize this potential containment, one will fail to seek explanatory connections among different powers in the soul. Imagine that one denied that there were such priority relations among different kinds of souls. In that

different levels of generality a kind can be related to its sub-kinds as genus to species even if those sub-kinds themselves have sub-kinds beneath them. E.g., *Animalia* will count as a genus with *Chordata, Echinodermata, Arthropoda,* etc. as its species even though one can also characterize *Chordata* as a genus with *Vertebrata* as one of its species.

21 There are other ways of understanding this potential presence of lower-sided figures in higher-sided figures. First, one might think the issue is numerical insofar as the number of sides of a higher-sided figure contains within it the number of sides of a lower-sided figure. However, it is not clear on this interpretation why then Aristotle depends on a geometrical rather than a numerical example. Second, one might think that a higher-sided figure potentially contains a lower-sided figure insofar as one could divide the higher-sided figure into the lower-sided figure. E.g., if I put a diagonal line through a quadrilateral, I will have formed two triangles. Likewise, if I connect two points on a pentagon that don't share a side, I will have formed a quadrilateral and a triangle. This is a plausible interpretation, but then one might think that this potential divisibility isn't really essential to what it is to be a pentagon or quadrilateral even if such divisibility necessarily belongs to such figures. If one instead thinks that Aristotle's comparison is based on the idea that higher-sided figures (at least some of them) are constructed out of lower-sided figures in geometrical theorems, then one can see why it would be essential to those higher-sided figures that they potentially contain the lower-sided ones. What it is to be a pentagon is to be a figure constructed by way of triangles. Hence, were one to fail to recognize this aspect of a pentagon, one would be failing to understand its essence.

22 Aristotle's own example of a triangle's being potentially present in a quadrilateral may depend on how a parallelogram with a certain angle and side lengths are constructed by constructing triangles (Euclid (23), *Elements*, Book I, Proposition 42).

23 An implicit assumption is that every genus has more than one species under it.

24 Frey (13), p. 90. I have added premises to Frey's argument to make its reasoning more explicit.

25 Aristotle makes clear in 414b20-25 that the comparison is between the different kinds of figures and different kinds of souls and not just among the powers of the souls themselves.

26 *De Anima* II.3 414b29-415a1, trans. CDC Reeve (with minor modifications)

case, one wouldn't be in a position to investigate why it is that certain powers of the soul can exist on their own, whereas others presuppose certain other powers.[27]

Gareth Matthews on Aristotle's definition of life

At this point, I turn to two prominent interpreters of Aristotle's definition of life – Gareth Matthews and Christopher Shields – and show how their opposed interpretations both fail to capture the kind of non-univocal definition of life Aristotle gives here in *De Anima* II.3.

In interpreting Aristotle's definition of life, Gareth Matthews proposes that there is a common attribute all life functions and their corresponding powers have in common. In particular, he defines these powers for different life functions (what he calls 'psychic powers') in the following terms:

> *x* is a psychic power for species *s* = $_{df}$ for *s* to be preserved individual organisms that belong to *s* must, in general, exercise *x*.[28]

Then, Matthews can define some substance's being alive in the following terms:

> *x* is alive = $_{df}$ there is a species *s*, and a psychic power *p*, such that *x* belongs to *s*, *p* is a psychic power for species *s*, and *x* can exercise *p*.[29]

As Matthews admits, the definitions will involve circularity, since what it is for an individual organism to be preserved is for its life to continue.[30] Hence, one will define life in terms of psychic powers and psychic powers in terms of an organism's preservation and this preservation in terms of life.

Matthews' response to this circularity objection is unconvincing, but as an interpretation of Aristotle's quite distinctive way of defining life and the soul in *De Anima* II.3, it is even less promising. For according to Matthews' interpretation, Aristotle is really offering a univocal definition of life after all. What it is to be alive is to belong to a species and to have a psychic power for that species, and this applies equally to sponges, dogs, humans, and even (as Matthews says) gods.[31]

Christopher Shields on Aristotle's definition of life

Another interpretation is provided by Shields himself, who takes Aristotle to give the following account of what it is to be alive:

> *x* is alive = $_{chdf}$ *x* is an intentional system[32]

Shields defines an intentional system as 'a system whose nature is accurately explained and whose behaviour is reliably

27 One question in the *De Anima* is why Aristotle defines the soul at the level of generality he does without going further. For given his stricture in *De Anima* I.3 407b20-26 that souls be properly fitted to bodies, one might have thought that one would need to define not just perceptual soul in general but the kind of perceptual soul a dog has in particular. I think the reason Aristotle doesn't do this is because of what he says here in *De Anima* II.3. Aristotle's intention in the *De Anima* is to define the soul, but it turns out that one can't give a definition of the soul in general as one could of a genus. Rather to define the soul, one needs to define the first member in the series, then each subsequent member. Yet once one has done this, one has fully defined the soul as such. Now, there will be ways to further determine a soul – not just the soul of an animal but the soul of a dog – but these further forms of specification do not involve potential containment. Rather they are more straightforward instances of the *determinable-determinate* relation. Hence, whether a locomotive soul enables walking or flying or swimming will still be essential to the kind of soul that it is, but the specification of a locomotive soul as a walking-enabling soul or flying-enabling soul or swimming-enabling soul will be mere determinations of the determinable *locomotive*.

28 Matthews (14), p. 191. Matthews also provides a definition of psychic powers not relativized to a species, but that definition seems to have a typographical error.

29 Matthews (14), p. 191.

30 Matthews (14), p. 192.

31 Shields (12), pp. 182–183 provides these two objections to Matthews. He also criticizes Matthews' definition for being 'species-dependent' and hence 'biocentric,' which excludes the possibility that a being could be alive which belonged to no species (as Aristotle's god doesn't). However, I see no reason to saddle Aristotle with the requirement that any adequate definition of life in the *De Anima* needs to include god(s). Indeed, in Aristotle's context, it is quite unclear what exactly 'god (*theos*)' refers to, since it need not refer to a purely immaterial being even if this is Aristotle's ultimate view in the passage Shields cites from the *Metaphysics*. Rather Platonist philosophers around the time of Aristotle conceived of immortal material beings, which they called both 'animals' and 'gods,' which dwelt somewhere in the atmosphere, were composed of a single type of element (fire or air), and had the powers of perception and thought. Aristotle shows in *De Anima* III.13 that such beings are impossible because anything which has the powers of perception must be composed of a mixture of elements, but Aristotle considers these beings a live theoretical possibility that he can only rule out once he has his full theory of perception in place at the end of the *De Anima*.

32 Shields (12), p. 189. The operator '$=_{chdf}$' signifies that one is giving a 'core-dependent homonymous definition.' This is a non-univocal definition in which there is a primary (core) way of being *F* and various secondary ways of being *F*, which are *F* in virtue of being related in certain ways (w_1, w_2, etc.) to the primary way of being *F*. Hence, e.g., there is a primary way of being healthy (the way a healthy animal is healthy), and there are secondary ways of being healthy, e.g., a diet is healthy because it produces health in the animal; urine is healthy because it signifies that the animal is healthy, etc. One difficulty is specifying which ways of being related count for the purposes of core-dependent homonymy. Shields accepts what he calls 'Cajetan's Proposal' in which the four modes of causation exhaust the ways of being related to the core way of being *F* (Chapter 4.4 in 1999).

predicted by understanding it as engaging in certain forms of end-directed behaviour' and 'whose activities can be assessed in part by the degree to which it attains its goals, and indeed a system whose goals provide a normative standard of its being a good instance of its kind.'[33] Later, Shields clarifies that life requires that *x* be a 'native' intentional system (as opposed to a 'non-native' intentional system) where a native intentional system is one whose 'ends are not derived from the designing activities of external agents.'[34] One distinguishing mark of native versus non-native intentional systems is that only for the former is it intelligible to speak of something's being good for that system. E.g., it's intelligible to say that it's good for the ficus that it be watered but not intelligible to say that it's good for the computer that it be cooled down.

One problem with Shields' proposal is that it's still unclear how he avoids ascribing a univocal definition of life to Aristotle. To respond to this worry, Shields says that there are different ways of being an intentional system in virtue of there being different ends towards which different things' behavior is directed. On its own, this doesn't answer the worry because this kind of variety is compatible with univocity. For instance, there are different ways of being an animal, but animal in general can be defined univocally. What Shields needs is for there be an intentional system which is the primary way of being an intentional system, and for other intentional systems to be intentional systems only in virtue of being appropriately related to this primary way of being an intentional system.

In fact, Shields' ultimate proposal is just this: God is the primary intentional system, and other living things are intentional systems only in virtue of God's bearing a formal-causal relation to them. I will set aside the difficult question of whether it is possible for there to be a formal cause which is not univocal with what it is the formal cause of.[35] Whatever the merits of such a proposal, it cannot be how Aristotle defines life. Indeed, it seems to be nearly the opposite of Aristotle's view, which is really a kind of 'bottom-up' view of life and not like Shields' 'top-down' view. For on Aristotle's definition, one defines life by first defining the most common life-function: nutrition. Then one defines increasingly advanced forms of life in terms of higher life-functions, but which in each case presuppose the presence of nutrition. Souls form a series, but the first member of this series isn't God's soul but rather the soul of plants. It is implausible, however, to think that plants are somehow more alive than non-rational animals or even humans. Hence, the first member in this series isn't the primary (core) way of being alive. There is no suggestion that there is a core way of being alive in Aristotle's definition of life.

Explaining the series

In this section, I consider Aristotle's project for the rest of the *De Anima*: explaining the entailment relations between different life functions. E.g., why is it that all living things which have the ability to move themselves from one place to another also have the distance senses? Here I will be fairly cursory in my treatment, but what I show is that for Aristotle there is essential information that can be causally explained which will simply be omitted if one fails to see the different forms of life and soul as serially ordered.

Entailment relations among life functions

In this passage in *De Anima* II.3, Aristotle sets out the various entailment relations and poses the question of what explains each one:

> And what the cause is due to which they have this order must be investigated. For without the nutritive part there is no perceptual one, though the nutritive is separated from the perceptual one in the case of plants. Again, without touch none of the other sorts of perception is present, but touch is present without the others. For many animals have neither sight nor hearing nor perception of odors. And of the ones that can perceive, some have the part capable of causing movement

33 Shields (12), p. 189. Shields' proposal is intentionally put in terms that avoid a commitment to an intentional system's actually having end-directed behavior.

34 Shields (12), p. 191. A more promising way to draw this distinction would be to rely on how Aristotle himself defines nature (*phusis*) in *Physics* II.1 The nature of *x* is a principle of being moved or resting in *x* which belongs to *x per se*, i.e., what it is to be *x* is to have such a principle. Hence, when the tattoo artist impresses a tattoo on himself, the principle of his making a tattoo (presumably, his skill as a tattoo artist) doesn't belong to the body that is being tattooed *per se*. What it is to be a body susceptible to being tattooed doesn't require that such a body itself have the skill to make tattoos. On the other hand, what it is to be a body susceptible to being nourished does require that such a body be ensouled – to be the kind of body that it is, it must have a soul. On Aristotle's way of drawing the distinction, whether nature is ultimately brought about by an external agent is irrelevant, and there's no reason to think he makes it a part of the concept of something's being natural that it be undesigned (perhaps however it ultimately goes beyond the powers of human-caused design to actually create a nature).

35 Shields argues for this possibility, but as he admits his examples are deeply controversial. For instance, he thinks that the perceptible form in an external object which one perceives (e.g., the whiteness of a surface) and the form of whiteness which is present in one's sense-powers are non-univocally white but that the external object's form is the formal cause of the form in one's sense-powers. However, against this interpretation, the form in the external object and in one's sense powers are 'one and the same,' so they seem to be white univocally.

> with respect to place, whereas others do not. Finally, and most rarely, they have rational calculation and thought. For among the ones capable of passing away, those that have rational calculation also have all the rest, whereas of those that have each of the others, not all have rational calculation, on the contrary, some do not even have imagination, whereas others live by this alone.[36]

Causal explanations of the entailment relations

Having set out these entailment relations, Aristotle now requires causal explanations for each one, but the type of causal explanations he will invoke for each need not be of one kind. Let's take each of these entailment relations and summarize Aristotle's explanation.

> If *x* can think, then *x* has non-tactile perception[37] (but not *vice versa*).
> If *x* has non-tactile perception, then *x* can move itself (and *vice versa*).
> If *x* has non-tactile perception and can move itself, then *x* has touch and appetite (but not *vice versa*).
> If *x* has touch and appetite, then *x* can nourish itself (but not *vice versa*).[38]

First, why does the ability to think entail that something has non-tactile perception? Aristotle's explanation involves two steps: (i) acts of thinking depend on the exercise of imagination, and (ii) imagination is essentially a process brought about by acts of perception, which only an animal capable of perception can engage in.[39]

Second, why are non-tactile perception and the ability to move one's body from one place to another mutually entailing? Aristotle gives a final-causal explanation. The distance senses are necessary for an animal's ability to move itself to be of any actual benefit to it. It is because the animal can perceive potential food and mates at a distance that it is able to direct its motion towards these and away from dangers. If the animal lacked the distance senses, its ability to direct its own motion would be pointless.

Third, the possession of the distance senses entails the possession of touch but not *vice versa* insofar as touch is more necessary for the preservation of the animal than these others. For whether something is actually beneficial or harmful to the animal is determined by what it does to the animal when it's in contact with it. These benefits and harms are perceived as pleasures and pains by the animal, and hence it is the association of certain sights, sounds, and odors with tangible or tasteable pleasures or pains that make the distance senses useful. Without touch, none of the distance senses is actually useful for the survival of the animal.

Finally, nourishment is necessary for anything to be alive insofar as that thing is something which is generated at a certain time. Hence, the presence of nutrition is entailed just by the living thing's being something that came into existence at a certain time. Why is this? Because what is generated must (at least typically and as a species) have a time of growth, a prime at which it is at its mature size, and a period of decline until its death. Each of these can only occur in something which is being nourished where (i) during its growth period it takes in more nourishment than it needs to maintain itself, (ii) during its prime it takes in enough nourishment to maintain itself, and (iii) during its decline it takes in less nourishment to maintain itself.

How does Aristotle explain the failure of entailment in certain cases? For instance, why is it that an animal can have touch without having the other senses? Here, Aristotle appeals to an absence of hypothetical necessity. Is it possible for an animal to survive without being able to perceive its potential food from a distance? Yes, so long as it is able to be nourished by whatever is likely to come within its grasp. Hence, the survival of certain animals doesn't require that they have the distance senses, and hence there is no final-causal reason for them to have such senses. Couldn't there be a material-causal or efficient-causal reason for them to have such senses however? That seems possible (indeed, one might take the mole as a more limited instance of this, given its blindness). However, such reasons would only explain why there were some instances of animals with distance senses which served no purpose for their survival, and it wouldn't give an explanation for why all animals with touch need have the distance senses.

The parochialism objection

In this section, I want to take up an issue I mentioned earlier in the context of defining nutrition. As I interpret Aristotle, the actual biochemical process by which food is transformed into a form such that the body can use it for its activities is essential to the process of nutrition itself.[40] Hence, when

36 415a1-11.

37 Non-tactile forms of perception are just the distance senses: sight, hearing, and smell. Aristotle's account of taste is complex, but he generally associates it with touch.

38 Matthews (14), pp. 188–189.

39 There's a gap in Aristotle's explanation insofar as Aristotle claims that animals with thought have all the other powers (including non-tactile perception), but his explanation here only explains why animals with thought have at least one sense power.

40 This kind of position isn't unique to Aristotle. So, e.g., Pace (15) argues that any living thing must be carbon-based, that it must have

Aristotle speaks about the different 'functions [*erga*]' of life, he is not merely thinking of functional roles that can be played by any number of different material bases. Rather the kind of matter involved in such life functions is essential to its being the function it is.

One objection to this way of proceeding is that it delivers a 'parochial' definition of life. For instance, Shields objects to any definition of life which would require that something must be organic (in particular that it be composed out of DNA) to be living.[41] I think this is a mistake and that we should require that something be organic even in the narrow sense of its being composed out of cells which contain genetic information encoded in DNA.

One might balk at such an idea. What if we were to find something which engaged in all the same processes as a living organism but were composed out of inorganic matter instead? Surely, we'd be unreasonable to refuse to ascribe life to such a being.

However, if the processes of a living organism are essentially enmattered in a particular way such that e.g., nutrition involves certain identifiable biochemical processes, then only an organism composed out of cells would be able to engage in this process. And while at the outset of biological inquiry, the material composition of a living being is undetermined, what biological inquiry ultimately discovers isn't merely what particular living beings happen to be composed out of. Rather it discovers the material cause of these living beings – something essential to their being the kinds of living beings they are.

Here is a comparison. Pre-scientifically, one might define a fish just as an animal capable of swimming in the water and living its whole life in water. On such a definition, whales would be a kind of fish because like fish they live for their whole lives in water and swim through the water like fish. However, with the discovery that fish have gills and whales have lungs, it became clear that each was able to respire in essentially different ways. Now according to the parochialism objection, it would be unreasonable to deny that whales were fish just because they have a significantly different compositions of organs. However, it's clearly reasonable in such a case to refine our initial merely nominal definition of fish such that we specify the particular organs by which such an animal is enabled to live its whole life in the water. The process of scientific inquiry puts us in a position to give definitions that get at the essence of what is being defined, and we need not rest content with definitions developed merely on the basis of ordinary pre-scientific observation of superficial similarities.

Likewise, were we to discover some other beings in the universe which engaged in processes that were qualitatively indistinguishable from our life functions but which lacked any cellular composition, it would be reasonable for us to continue to insist that cellular composition was essential to being alive. Under those circumstances, we might describe such non-cellular beings as 'alive,' but it would be clear that we were using the term in an extended sense. Now what would be parochial in such circumstances wouldn't be maintaining a definition of life in terms of cellular composition. Rather what would clearly be parochial would be merely taking life to be more valuable than the kind of existence such non-cellular beings possessed. Likewise, for theists, one need not revise one's definition of life so as to include God in its extension in order for one to appreciate God's existence as superior to our own.[42]

What is the relation between Aristotle's 'parochial' definition of nutrition and the hierarchical nature of life? A 'parochial' view is more tempting when one takes nutrition to be the basic life process, whereas Shields who takes a core-dependent

proteins composed out of the 20 common amino acids, that it must have genetic information stored and conveyed by nucleic acids, and that it must engage in one of the two basic forms of energy transformation (either photosynthesis or lithotrophy). Hence, the kind of organic chemistry one finds in forms of life on earth is necessary for any form of life anywhere.

41 See both Shields (12), pp. 177–178, and Shields (16) for this objection.

42 I haven't spoken here to the objection that Aristotle himself speaks about God's having a 'life' in Aristotle (21), *Metaphysics* Lambda 7 1072b26-30. First, the *Metaphysics* passage does not intend to give a definition of life both because then Aristotle would be giving an obviously deficient definition of life and because it is the *De Anima* and not the *Metaphysics* which actually has living being as its subject and hence which needs to give a definition of life. The definition would be obviously deficient because defining life as the actuality of a mind would be extensionally inadequate in the extreme. Second, the way Aristotle's argument works here involves taking for granted the *De Anima* definition of life and can't involve modifying it. For what Aristotle is doing is giving an analogy of proportion. Aristotle claims that the activity [*energeia*] of mind is life, but instead of giving a definition what Aristotle is doing is giving an extended use of the term 'life.' The activity of a human mind is its life because the higher forms of life potentially contain the lower ones within it and so the activity of this mind won't just be its mental activity. Just as the activity of this human mind is its life, one can extend the term 'life' to whatever is the activity of a mind. Hence, one can describe God as his own life or even alive. Third, that God is alive is a common philosophical and non-philosophical opinion among ancient Greeks, and so Aristotle feels compelled to give an account of how God is alive within his philosophical system even if ultimately accommodating this opinion ends up putting him in tension with his own more basic philosophical commitment to how life ought to be defined in the *De Anima*.

homonymy view with the life of God as primary has to avoid any kind of parochial view for any of the functions involved. All that matters is their resemblance to an immaterial process (God's thinking), and so no material aspect of their life functions can be essential to their being life functions. Still, the two theses are logically independent. One could take nutrition to be basic in the hierarchy and give a non-organic definition of nutrition, and conversely one could give a univocal definition of life in which all that's involved in being alive is something like engaging in reproduction via the transfer of genetic information encoded in DNA to new cells.

Conclusion

Aristotle's definition of life is distinctive because he does not think it can be defined as a kind further specified by sub-kinds. Rather one must define the life-functions which are common to all living things and then define higher forms of life insofar as the more advanced forms of life potentially include the more basic ones in them. For example, the life of an animal potentially includes the life of a plant, since the animal engages in the process of nourishing itself like the plant and further has the ability to perceive.

Aristotle's definition of the most common life-function – nutrition – is not undermined by two common objections – the circularity objection and the parochialism objection. The process of nutrition is defined by Aristotle in terms of its four causes, and although this involves specifying that the material cause of nutrition is the ensouled body, Aristotle's position is that the body's being ensouled explains its being alive. Hence, there is no circularity here. To the parochialism objection, nutrition isn't a process that can be defined in purely functional, i.e., purely formal, terms. Rather the distinctive kind of biochemical processes which nutrition consists of are essential to it, and so what it is to be alive essentially involves such processes.

I have limited myself here to expositing Aristotle's position on what life is, but this clearly leaves certain questions open. First, Aristotle's definition makes no mention of a living thing's being essentially capable of Darwinian evolution. Is this an omission on his part? Or is the capacity for Darwinian evolution something an adequate definition of life ought to put one in a position to explain rather something one ought to bake into one's axioms? Second, Aristotle's hierarchy of lives only includes the lives of plants, non-rational animals with only touch, non-rational animals with the distance senses as well, and rational animals. Is there a way to incorporate the kingdoms of organisms since discovered in this hierarchy? Is more radical revision required or is the whole idea of such a hierarchy no longer tenable? Third, although Aristotle himself does not take intelligent living beings to be 'more alive' than other living beings, is a Neo-Aristotelian definition of life which takes intelligence to be the primary way of being alive preferable to Aristotle's own definition which takes nutrition to be basic? Or is there more that can be said in favor of Aristotle's way of proceeding?

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