Melina G. Mouzala [Ed.]

Cognition in Ancient Greek Philosophy and its Reception: Interdisciplinary Approaches

ACADEMIA

Academia Philosophical Studies 86

Melina G. Mouzala [Ed.]

Cognition in Ancient Greek Philosophy and its Reception: Interdisciplinary Approaches

ACADEMIA

Coverpicture: Atenea (copia de museo) © Ana Tramont – stock.adobe.com

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at http://dnb.d-nb.de

ISBN 978-3-98572-174-0 (Print)
978-3-98572-175-7 (ePDF)

Online Version
Nomos eLibrary

1st Edition 2024

Visit our website
academia-verlag.de

Biology in the *Timaeus*' Account of *Nous* and Cognitive Life

Douglas R. Campbell
Alma College, Philosophy Department,
Assistant Professor

Abstract

In this paper, I develop an account of the role that biology plays in the *Timaeus*' view of *nous* and other aspects of cognitive life. I begin by outlining the biology of human cognition. I then argue that these biological views shine an important light on different aspects of the soul. I then argue that the human body is particularly friendly to *nous*, paying special attention to the heart and the liver. I next consider the ways that the body fails to protect our *nous*. I conclude by comparing human *nous* with the cognition of non-humans.

Plato explains his biological system primarily in the *Timaeus*. The development of this biological system shines a different light on human cognition than any of the other Platonic dialogues. If we read only the *Phaedo*, for instance, we might think that the body does not contribute anything positive to human cognition at all, except for the way that perception provides us with the trigger for recollection. The *Timaeus* adds much to our appreciation of Plato's theory of *nous*, which is roughly equivalent to something like 'understanding', although I shall leave the word untranslated throughout this paper, and to Plato's theory of human (and non-human) cognition overall. It adds to our appreciation by filling out what in the human body facilitates and frustrates *nous*: what our anatomy must be like in order that *nous* be possible; which organs in our bodies interact well with the rational kind of soul; and which forces in our body should not come into contact with the soul because cognition will be disrupted if they do. These aspects of Plato's biology are what this paper is concerned with.

This is a small departure from how Plato himself pursues biology. Overwhelmingly, Plato pursues biology as a case study of larger principles of natural philosophy, such as the principles of cosmology, theology, and

physics. For instance, when he is investigating the nature of human hair, he is doing so always with an eye to capturing the way that hair illustrates the gods' care for us and the way that the mechanics of hair-creation instantiate broader principles of physics and chemistry (*Ti.* 76c-d). For this reason, scholars rightly talk about Platonists as having a *top-down* approach to the natural world: Plato does what we would call *science* by arguing for general principles and then applying them to particular cases, such as the creation of hair and fingernails.[1] In this paper, I do not want to lose sight of the gods' involvement (and it is operative in the foreground in the first section), but the important lesson here is *not* contained in the way that the biological foundations of cognition reflect broader natural-philosophical principles. It is contained in the interactions between the body and *nous*.

Let me begin with some brief background that illustrates some of the larger theology and cosmology here. In Plato's *Timaeus*, the whole universe is a living thing (*zōon*). It is a living thing because it is composed of a body and a soul, having been put together by the divine craftsman, the Demiurge, whose name comes from the Greek word *dēmiourgos* ('craftsman'). The Demiurge transformed a disorderly, chaotic mess into the perceptible world that we are familiar with today; the chaos was transformed into the world's body. The world has a *soul* because it needed to: the Demiurge would not have been satisfied until the world was as good as it could be, and this required its being intelligent. It could not have been intelligent unless it had a soul. Therefore, the world has both a soul and a body; it, accordingly, is a living thing.

This preamble is helpful because it sets up a crucial point for understanding the biological conditions of *nous*: the world itself has cognition, too, and human cognition is structurally the same as the cognition of the world. The reason for this is that our souls were made by the Demiurge as well (*Ti.* 41d-e). As we shall see below, *our bodies were not*. Our souls are, generally speaking, not different from the universe's. Our biology, however, is. Our bodies were made by what I shall call the *lower gods*, who are assistants or servants of the Demiurge, who carry out his bidding. They made us at the Demiurge's behest (*Ti* 41-cd). Our cognition ends up being different from the universe's not because our souls are different but because our biology is so different from the world's.

1 For more on Platonism's top-down approach to the natural world, see Gerson (2005), pp. 31-32, and also the applications of this distinction throughout Gerson (2014).

I shall begin by surveying passages in the *Timaeus* that illustrate the biology of cognition. In the second section, I shall briefly infer some important general lessons about Plato's theory of cognition and the human soul from these passages. In the third section, I shall talk about two important organs in the body: the liver and the heart. In the fourth section, I shall talk about health and disease as they relate to cognition. I shall then conclude by comparing human cognition with non-human cognition.

1. The material conditions of human cognition

Here, I will be developing an account of the material conditions required for human cognition according to Plato's *Timaeus*. When I talk about the material conditions, I mean specifically the *biological* conditions required for human cognition.

Our cognition is either facilitated or impeded by our body. That is because both *nous* and *doxa* (belief) are conceived of by Timaeus as circular motions that happen in space. Consider the following important passage:

> Because the soul is a mixture of the Same, the Different and Being (the three components we've described), because it was divided up and bound together in various proportions, and because it circles round upon itself then, whenever it comes into contact with something whose being is scatterable or else with something whose being is indivisible, it is stirred throughout its whole self. It then declares what exactly that thing is the same as, or what it is different from, and in what respect and in what manner, as well as when, it turns out that they are the same or different and are characterized as such. This applies both to the things that come to be, and to those that are always changeless. And when this contact gives rise to an account that is equally true whether it is about what is different or about what is the same, and is borne along without utterance or sound within the self-moved thing, then, whenever the account concerns anything that is perceptible, the circle of the Different goes straight and proclaims it throughout its whole soul. This is how firm and true opinions [*doxa*] and convictions come about. Whenever, on the other hand, the account concerns any object of reasoning, and the circle of the Same runs well and reveals it, the necessary result is reason [*nous*] and knowledge [*epistēmē*]. And if anyone should ever call that in

> which these two arise, not soul but something else, what he says will be anything but true (*Tim* 37a-c).[2]

This reflects the fact that the Demiurge has made the world's soul out of circles. These circles map onto the orbits of the various heavenly bodies, such as Mercury and Mars. The soul's cognition is analyzed in terms of the motions of these circles.

The human soul is composed of the same circles, too. Timaeus presents our cognitive activities such as *nous* and *doxa* as similarly consisting of the motions of these inner psychic circles. This geometrical approach to human cognition helps us understand why our bodies are designed the way that they are. The first biological condition of our cognition illustrates this well: the shape of our head. Our round head is able to contain these psychic circles and let them move appropriately. The gods have designed our head to facilitate our cognition, just as the Demiurge made the world round in order to facilitate the psychic motions of the soul of the whole world.

Another important biological condition concerns the distribution of flesh throughout our body. Flesh serves an important function for us. Specifically, it protects some important internal tissues. What I mean is that *our soul is contained within our body*. It is contained in one of our tissues: the marrow. The marrow is vulnerable, so the gods created our bones to protect it. Our bones also needed protection, especially the skull which houses the rational kind of soul, and which has been designed to facilitate our cognition.

The problem is that the gods have to compromise when it comes to distributing flesh throughout our body. More flesh would lead to our being better protected. But flesh comes at a serious cost to our cognition. Firstly, he says: "if there were a thick layer of flesh there, packed extremely densely together, its hardness would cause a kind of insensibility, which would make thinking [*dianoian*] less retentive and more obscure" (74e). A little later, he adds:

> For there is no way that anything whose generation and composition are a consequence of Necessity can accommodate the combination of thick bone and massive flesh with keen and responsive sensation. If these two characteristics had not refused their concomitance, our heads above all else would have been so constituted as to possess this combination, and the human race, crowned with a head fortified with flesh and sinews

2 All translations of the *Timaeus* here are from Zeyl (2000).

> would have a life twice, or many more times as long, a healthier and less painful life than the one we have now. As it was, however, our makers calculated the pros and cons of giving our race greater longevity but making it worse, versus making it better, though less long-lived, and decided that the superior though shorter life-span was in every way preferable for everyone to the longer but inferior one. This is why they capped the head with a sparse layer of bone—and not with flesh and sinew, given that the head has no joints. For all these reasons, then, the head has turned out to be more sensitive and intelligent [*phronimotera*] but also, in every man's case, much weaker than the body to which it is attached (75b-d).

What we see in these passages is that *another* biological condition for good cognition is a reduced quantity of flesh. The shape of the head is crucial for our cognition, but so is what our body is composed of. The idea seems to be that the density of flesh prevents our body from being sufficiently sensitive to the world around it; the result is that we are less retentive of what we perceive. The difficult thing is that it is precisely this density that makes flesh a good source of protection from the world.

Therefore, the gods need to compromise. This is reflected in the above passage, *Ti.* 75b-d, to the extent that the gods weigh the pros and cons of each addition to our body. Ultimately, they settle on the solution that has our body be more sensitive to the external world, allowing better cognition, but that also has our body be more vulnerable to the environment, leading to a shorter lifespan.

There are a couple of things that we can learn at this point. The first is that the gods are trying to make our body as good as possible. Indeed, that is what Plato says: "our creators recalled their father's instruction to make the mortal race as excellent [*ariston*] as possible" (71d). However, there is a difference between being perfect and being as good as possible. The gods who are designing our body as appropriate to our soul cannot achieve this outcome perfectly. Instead, they are operating under serious constraints. The best example of these constraints is what we just looked at: the gods are trying to solve a problem with the protection of our soul within our marrow, and the best way that they can do is to cover us up with a tissue, flesh, that would impede our cognition; so, they have to settle on a compromise. This illustrates why Plato has attached the qualification 'as possible' to the commandment that the gods have to make our body excellent – as excellent *as possible.*

Another lesson that we learn is that the body serves our soul. Tissues such as flesh serve our soul. In fact, that is what all of the organs in our body do. Indeed, Plato says as much here: "they [that is, the gods] bound organs inside it [that is, the body] to provide completely for the soul" (45a). Let me illustrate this with an example. The gods created the neck to protect our reason in another way (69d-e). Specifically, the psychic circles that I described earlier are in danger of being overpowered by the motions of the appetitive and spirited kinds of soul, which exist near the liver and heart respectively. In order to protect our body's cognition, the gods create our neck, which increases the distance between the rational kind of soul and the spirited kind of soul. This again reflects the way that the gods care for our soul.

However, the example of flesh illustrates the imperfection of the gods just as much as it illustrates their good intention and aims. The gods were not perfect. Even though the rational kind of soul is protected in some sense, it is still in danger from various forces. Bodily disease is a real danger to our cognition that the gods simply could not eliminate. Plato warns us in this passage:

> And as for pains, once again it is the body that causes the soul so much trouble, and in the same ways. When any of a man's acid and briny phlegms or any bitter and bilious humors wander up and down his body without finding a vent to the outside and remain pent up inside, they mix the vapor that they give off with the motion of the soul and so are confounded with it. So they produce all sorts of diseases of the soul, some more intense and some more frequent than others. And as they move to the three regions of the soul, each of them produces a multitude of varieties of bad temper and melancholy in the region it attacks, as well as of recklessness and cowardice, not to mention forgetfulness and stupidity [*dusmathias*] (86e-87a).

This interesting passage reveals that the vices that belong to various kinds of soul can be caused by bodily forces, such as phlegm. For instance, the spirited kind of soul can become cowardly if assaulted by these forces. Meanwhile, our cognition can be disrupted in such a way that we become stupid (*dusmathes*). This highlights that yet another biological condition for good cognition is *health*. Ill people can (literally) become stupid, among other things such as reckless and cowardly.

Further, it also highlights the way that our bodies are imperfect, even though they were designed by well-intentioned creators. After all, a perfect

body would not become diseased. Indeed, the Demiurge created the body of the world such that *it* is free from disease (33a). Evidently, our bodies were created imperfectly. This speaks to Plato's praise of exercise (88b-e). Exercise – just moving our body vigorously, in Plato's eyes – is a way of making it more likely that the right substances will go to the right place. For the sake of our cognition, we need to exercise.

Let us reflect on this point. We can learn that the gods have put together our body in a way that aims as much as possible at promoting and facilitating the activities of our soul, which are conceived of as circular motions. We have also seen that other forces in our body, such as the non-rational kinds of soul, and substances, such as phlegm, pose a threat. The gods did what they could do to mitigate the threats posed by these things.

To this extent, our bodies are *appropriate* to the soul that we have. There are other kinds of bodies, however, that are not appropriate to the soul – but are appropriate in another sense. We ought to remember that Plato believes in reincarnation. Our bodies are appropriate for human cognition (as much as possible, anyway), but the same cannot be said of every kind of body. When or if we are re-born as cows, for instance, our souls will not benefit from having a body that is appropriate to its activities and well-being. We see this in this passage:

> Land animals in the wild, moreover, came from men who had no tincture of philosophy and who made no study of the universe whatsoever, because they no longer made use of the revolutions in their heads but instead followed the lead of the parts of the soul that reside in the chest. As a consequence of these ways of theirs they carried their forelimbs and their heads dragging towards the ground, like towards like. *The tops of their heads became elongated and took all sorts of shapes, depending on the particular way the revolutions were squeezed together from lack of use.* This is the reason animals of this kind have four or more feet. The god placed a greater number of supports under the more mindless beings, so that they might be drawn more closely to the ground. As for the most mindless of these animals, the ones whose entire bodies stretch out completely along the ground, the gods made them without feet, crawling along the ground, there being no need of feet anymore (91e-92b; emphasis mine).

I want to highlight the part of the passage concerning these land animals – let us say he is talking about cows in particular – that I put in italics. What this emphasizes is that cows lack intelligence because their bodies are

not right for their souls. If our heads were not round but oblong, we would not be capable of intelligence. One of the biological conditions required for cognition is a spherical head – but this condition is not satisfied by a cow's body, because its head is oblong instead of spherical.

However, its *body* is still appropriate to it – but in a different sense of appropriateness. Specifically, its body is appropriate to it because in a past life, the human being who ended up becoming a cow failed to use his or her reason. That person paid no attention to what was happening in Heaven, so they were reborn into a body that had a head that was appropriate to that way of life: the head hangs close to the ground, and the person cannot make effective use of their reason any longer.

This teaches us that there is a deeper sense of appropriateness operating here – deeper than just the sense that a soul made of circles needs something spherical to move in. In conclusion, I say that as we consider the biological conditions required for human cognition in the *Timaeus*, we need to keep in mind that the gods are making not just *a* body for us but *the right body* for us – a body that reflects who we truly are. As human beings, who we truly are is our reason, and we need bodies that let us express that fact. As cows, donkeys, horses, or snakes, we are people who failed to be rational, and our bodies are so designed to frustrate the kind of cognition that our human bodies designed to allow.

2. The significance of biology for a theory of the soul

The foregoing discussion of biology reveals something important about the soul and about *nous*: it exists in space.[3] We can see this in some of the passages above. For instance, when Plato is explaining the existence of the neck, he says that it exists in order to provide distance between the different kinds of soul (69d-e). If they were closer together, the activities of spirit and the appetites would pose an even greater threat to reason than they currently do. At first, we might be tempted to say that Plato is speaking figuratively. Note, however, that if he means this claim figuratively, he has not explained the neck at all. If we interpret this part of the *Timaeus* figuratively, we deprive it of its explanatory content altogether. The require-

3 For larger discussions and studies of this conception of the soul, see Carone (2005), Fronterotta (2007), and Campbell (2022a), although each article takes a different approach to this conception of the soul as extended in space. (For instance, Carone thinks that the soul *depends* on a body, which is much stronger than what I argue here.)

ment that our heads be round functions the same way. Without a round head, the motions of *nous* would be limited and distorted. Such a thing, in fact, happens in the case of non-human animals, such as cows, who have oblong heads. A figurative interpretation deprives Plato's theories of their explanatory power.

Moreover, we can similarly conclude that the soul must be the sort of thing that can come into contact with bodily forces and resist them. The explanation of psychic disorders teaches us this fact. We saw above that Plato talks about bile and phlegm interacting directly with the soul (*Ti.* 86e-87a). What is so striking about the idea that bile and phlegm could hit the soul is that Plato is speaking about the soul as if it were a body in its own right. Sometimes, scholars have inferred from such descriptions that the soul must be merely a state of the body.[4] In fact, that is Galen's view of the soul, inspired by these reflections in the *Timaeus*, which he believes that he is faithfully following.[5] One problem with this interpretation of Plato's text is that it attributes to Plato the view that the soul is nothing but an attunement or harmony of the body; for all intents and purposes, it is Simmias' view in the *Phaedo*. Plato *rejects* this view in the *Phaedo* decisively. The second problem with this view is that it subtly distorts what the *Timaeus* is saying. For Timaeus talks about the soul as if it were a body; he does not talk about it as if it were a *state* of the body. In other words, Timaeus thinks the soul is something that takes up space *as a substance in its own right*. He does not reduce the soul to a state of our body, in which case it would be *nothing but* the body. Instead, the soul interacts with the body.

A study of Plato's biology reveals this much to us: that the soul is extended in space, can come into contact with bodily forces, such as bile and phlegm, and resist them. This explains why biology is such an important site of research for Plato in the *Timaeus*, and a full understanding of his psychology requires taking into account what the body is like. In fact, this might be the most important insight of a study of Plato's biology for his theory of cognition: *we need to have a particular kind of body in order to facilitate cognition*. This goes beyond merely noting the length of the neck and the shape of the head. In the next section, we shall see that the liver and heart play essential roles in human cognitive life. These organs do not

4 See Gill (1997) and (2000).
5 See Galen (2013).

contribute to *nous* in particular, at least not directly, but they do contribute greatly to other parts of human cognition.

3. The body as the friend of *nous*: cardiology and hepatology

There are many respects in which the body is friendly to our cognition. This is not unexpected: earlier, we saw that Plato says that the gods created our organs to serve our soul (45a). Examples of this fact abound. For instance, our eyes exist in order that we might see the orderly heavens and imitate their revolutions in our own soul, which contains psychic circles that, ideally, have the same orbits as the planets whose motions we can observe in sight (47b-c). Our ears exist in order that we might, similarly, perceive orderly sounds and speech and then reproduce such order ourselves (47c-e). For the sake of this paper, I shall focus not on this aspect of perception, but instead on two organs.[6] First, I shall discuss the heart, and then I shall discuss the liver. Both of these illustrate a very important part of Plato's biology: namely, that the gods have designed our body in such a way that puts *nous* in charge.

Here is what Plato says about the heart:

> They [that is, the gods] scrupled to stain the divine soul only to the extent that this was absolutely necessary, and so they provided a home for the mortal soul in another place in the body, away from the other, once they had built an isthmus as boundary between the head and the chest by situating a neck between them to keep them apart. Inside the chest, then, and in what is called the trunk they proceeded to enclose the mortal type of soul. And since one part of the mortal soul was naturally superior to the other, they built the hollow of the trunk in sections, dividing them the way that women's quarters are divided from men's. They situated the midriff between the sections to serve as a partition. Now the part of the mortal soul that exhibits manliness and spirit, the ambitious part, they settled nearer the head, between the midriff and the neck, so that it might listen to reason and together with it restrain by force the part consisting of appetites, should the latter at any time refuse outright to obey the dictates of reason coming down from the citadel. The heart, then, which ties the veins together, the spring from which

6 For more on this aspect of perception in the *Timaeus*, see Brisson (1997) and Campbell (2022c).

> blood courses with vigorous pulse throughout all the bodily members, they set in the guardhouse. That way, if spirit's might should boil over at a report from reason that some wrongful act involving these members is taking place—something being done to them from outside or even something originating from the appetites within—every bodily part that is sensitive may be keenly sensitized, through all the narrow vessels, to the exhortations or threats and so listen and follow completely. In this way the *best part among them all can be left in charge* (69d-70b; emphasis mine).

There is much to say here. First, let us note what he says at the end of the passage: the anatomy and physiology of the heart are such that the best part of the soul is in charge. Second, Plato is recapitulating in biological terms the view from the fourth book of the *Republic* that spirit is the ally of reason (*R* 440b, 441e). In the *Republic*, the idea is that reason develops a conception of what is best for the whole person, but it might struggle to carry it out; accordingly, spirit can help enforce reason's order. In the *Timaeus*, this idea is put *biologically*. Our *nous* can exert itself on our body by communicating its orders through the heart, which is where the spirited kind of soul is located.

Let us think about how this happens physiologically. Imagine that I pick up some food that I want to eat but that I know is bad for me. My reason, on the one hand, has developed a conception of the good according to which this food is bad for me. My appetites, on the other hand, want me to eat this food. If the best part of me were not in charge, my appetites would get their way. In reality, though, the gods have designed our body such that my reason has a way of enforcing its conception of good and bad. The heart ties our entire circulatory system together. This circulatory system is created by the gods to replenish every inch of our body with resources delivered as blood (*Ti.* 77c-e). When it comes to the enforcement of reason's commands, the circulatory system *also* transmits these commands to the rest of the body. It has multiple jobs in the body. Spirit has been conveniently housed in this part of the body.[7] That is why Plato says, in the above passage, that the gods put spirit between the midriff, where our appetites lives (as we shall see shortly), and the brain, where our reason lives. Reason communicates with spirit, and then spirit causes the blood to boil over, and reason's commandment is transmitted through the circulatory system

7 For more on spirit in the *Timaeus*, see Wilburn (2014).

with the blood to the relevant limb. In this case, it is my hand that has to contract in such a way that I put the food down, finally giving into reason's exhortation.

Of course, Plato's reader must have many questions about this process. We cannot, sadly, answer every question about this process, due to how limited our evidence is, but we can make some sense of it. In the first place, Plato's cardiology relies on the view of the soul as extended in space and able to come into contact with bodily forces. The psychic circles of our *nous* are thus able to initiate a physiological process that in turn causes the blood in the heart to boil over. Perhaps this is akin to the way that our hypothalamus is able to control various systems in the body by secreting signalling hormones: these signalling hormones cause other organs to function differently.

After the heart has received its signal from the rational kind of soul and has caused blood to boil over, we might wonder about how reason's commandment carries enough force through the bloodstream to effect the appropriate muscular contractions. All Plato has said is that the relevant parts of the body are "keenly sensitized" on account of the narrow vessels in the blood that have transmitted the exhortation, such that the best part of us is in charge (70b). It is not obvious how to make sense of this, not least of all because Plato simply never even acknowledges the existence of muscle, which dooms any attempt to account for muscular contractions. I do suspect, however, that any good account of Plato's view here would attribute to him the belief that there are substances in the body that can cause what we would call our muscles to contract, and that the right quantities of these substances are transmitted through the bloodstream at the right moment by reason and spirit acting in conjunction. The result is that we experience the right contractions at the right time when our reason has been well-habituated. Ultimately, though, it does not appear to be Plato's goal to answer every question about this process. His focus in this passage seems to be more on the *phenomenology* of anger, shame, and related feelings: the way that our chest tightens up when we perceive that we might be about to do something that we think is right. This is the blood boiling over, and our body's limbs contracting appropriately in an attempt to avert shameful behavior.

Let us move onto the liver, which will complete our look at this aspect of Plato's physiology:

> The part of the soul that has appetites for food and drink and whatever else it feels a need for, given the body's nature, they settled in the area between the midriff and the boundary toward the navel. In the whole of this region they constructed something like a trough for the body's nourishment. Here they tied this part of the soul down like a beast, a wild one, but one they could not avoid sustaining along with the others if a mortal race were ever to be. They assigned it its position there, to keep it ever feeding at its trough, living as far away as possible from the part that takes counsel, and making as little clamor and noise as possible, thereby letting the supreme part take its counsel in peace about what is beneficial for one and all. They knew that this part of the soul was not going to understand the deliverances of reason and that even if it were in one way or another to have some awareness of them, it would not have an innate regard for any of them, but would be much more enticed by images and phantoms night and day. Hence the god conspired with this very tendency by constructing a liver, a structure which he situated in the dwelling place of this part of the soul. He made it into something dense, smooth, bright and sweet, though also having a bitter quality, so that the force of the thoughts sent down from the mind might be stamped upon it as upon a mirror that receives the stamps and returns visible images. So whenever the force of the mind's thoughts could avail itself of a congenial portion of the liver's bitterness and threaten it with severe command, it could then frighten this part of the soul. And by infusing the bitterness all over the liver, it could project bilious colors onto it and shrink the whole liver, making it wrinkled and rough. It could curve and shrivel up the liver's lobe and block up and close off its receptacles and portal fissures, thereby causing pains and bouts of nausea. And again, whenever thought's gentle inspiration should paint quite opposite pictures, its force would bring respite from the bitterness by refusing to stir up or to make contact with a nature opposite to its own. It would instead use the liver's own natural sweetness on it and restore the whole extent of it to be straight and smooth and free, and make that portion of the soul that inhabits the region around the liver gracious and well behaved, conducting itself with moderation during the night when, seeing that it has no share in reason and understanding, it practices divination by dreams. For our creators recalled their father's instruction to make the

> mortal race as excellent as possible, and so, redeeming even the base part of ourselves in this way, they set the center of divination here, so that it might have some grasp of truth (70d-71e).

This passage concerns the relationship between the rational kind of soul, in our head, and the appetitive kind of soul, which is located between the midriff and the navel, namely, in the liver. The first thing that we can observe here is the same as in Plato's cardiology: this account makes the most sense when it is read in light of the soul's status as extended in three-dimensional space and as able to come into contact with the body as corporeal things do. That is why Plato talks about the initiation of the use of coercion by reason in terms of the *force of our thoughts*.

The general picture being painted here is bizarre. It begins with a rather cogent claim: the appetites are so irrational that they could not possibly understand reason's instructions. In this respect, the appetites differ from spirit, which could heed reason's instructions when it receives them. The gods need a different physiological system in place, then. Accordingly, reason can entice the appetites non-rationally: it can use images, for instance, to threaten the appetites. The liver's surface is apparently such that it can receive images as a mirror can. Reason can also coerce the liver by shrivelling it and by closing off its entrances and exits, which Plato has called portal fissures and receptacles.

The nature of these images is unclear. Some scholars have argued that the images are an impenetrable mystery that we historians will never understand.[8] Some scholars have argued that the images are really in our mind, not on our liver.[9] Others have argued that the images are of threatening or pleasing things: the images represent things that have some emotional or persuasive hold over the liver or appetites.[10] I do not think that any of these views is right. The images on the liver cannot represent things that the liver is meant to outright respond to because there is no way for the liver to *see* the images on itself. The images on the liver cannot be images in our mind because the spleen is said to be in charge of cleaning up the mess made by the images on the liver (72c). If the spleen cleans up this mess, then the images need to be a part of a physiological process that is happening in the liver. As for the possibility that this is an impenetrable mystery, I do not think that we should or must give up here. Plato tells us what he means,

8 E.g., see Karfik (2005), p. 11.
9 E.g., see Moss (2011), p. 280.
10 E.g., see Stalley (1996), p. 396, and Lorenz (2011), pp. 245-246.

although it is oblique and not obvious to a modern reader unless we bear in mind the ancient practice of hepatoscopy.

Hepatoscopy is the practice of reading or interpreting signs from a liver. Plato is alluding to this practice when he concludes the above passage with the following sentence: "for our creators recalled their father's instruction to make the mortal race as excellent as possible, and so, redeeming even the base part of ourselves in this way, they set the center of divination here, so that it might have some grasp of truth" (71e). In fact, the whole discussion of Plato's hepatology concludes with this pronouncement: "this, then, explains why the liver's nature is what it is, and why it is situated in the region we say—it is for the purpose of divination" (72b).

We can re-read the passage with this fact in mind.[11] The images on the liver *are* the things that are being done to the liver: the changes in color, the wrinkling, the shrivelling up, the closures of entrances and exits, and so on. Today, we would not consider such things images, although we would recognize them as visual changes to the liver. The ancient Greeks, however, *would* consider such things images because they get a point across: either something good is going to happen, or something bad is going to happen. They are *messages* with visible content to the ancient person. The appetites are not aware of the visual changes *as such*, since, of course, they cannot see how the liver is changing. They do not have eyes. However, the changes are either painful or pleasant for the liver itself. The real coercive or persuasive work is being done not by the images themselves, but by, as Plato puts it, the pains and bouts of nausea.

If the images themselves are not part of the coercive treatment, then one might wonder how they feature into the account of reason's control of the appetites. The answer is that they do not. Plato, in his hepatology, is trying to explain multiple different things, only one of which concerns the best part of us being in control of our body. He *also* wants to explain, for instance, the fact that the liver plays such a large role in Greek divination, to the point that he thinks that the liver's nature is designed for divination.

When we put together Plato's hepatology and cardiology with other features of the body, such as the eyes and ears helping us detect models of orderliness and the shape of our head, a clear picture emerges: our body was designed to be the friend of our reason, and the best part of us was put in charge of the inferior parts through the heart and the liver.

---

11 For more on the ancient Mediterranean practice of hepatoscopy, see Collins (2008).

4. The body as the enemy of *nous*: psychic disorders

So much for the body being *helpful* for the soul. Let us talk about the way that our bodies fail us. First, we ought to say something about bodily disease in general, and then we shall move to considering the way that bodily disease leads to psychic diseases.[12]

Our bodies get sick. This is not true of the world's body, which is free from disease (33a). Sickness arises in the human body when the natural processes of replenishment are reversed or otherwise act contrary to nature (83a). The idea at the heart of Plato's conception of health is that our body is able to maintain homeostasis by means of the natural tendencies of the elements to coalesce. Specifically, we eat food, and through the digestive process, the food is cut up by fire that exists in our stomach. The fire is made up of tetrahedra, and the tetrahedra slice the food until it is transformed into its constituent parts, the four so-called elements: fire, earth, air, and water. Plato says that these elements coalesce in our body just as they coalesce in the larger cosmos outside our body (81a-b). In other words, my ankle might have lost some water due to the natural wear and tear of the environment. Through food, I have supplied my body with the water necessary to correct the lack in my ankle. The needed resource gets to the ankle through the bloodstream.[13]

However, when we think about what rules govern the coalescence of the elements in our body, *we cannot suppose that the rule is something inviolable.* The behavior of the elements might be regular and predictable, but it must admit of exceptions. The reason why is this: even though my ankle might need to be replenished with water to be healthy, bodies are not always healthy, even when we give them through food all of the necessary resources. Sometimes, my ankle might receive earth when it needs water; sometimes, my ankle or some other part of my body gets *diseased.*

With this in mind, Plato presents bodily disease as the *unnatural* behavior of the elements. The behavior is *unnatural* in the sense that it violates or otherwise acts contrary to what we might expect in light of what we think of as rules that govern the behavior of the elements. Consider this passage:

> How diseases originate is, I take it, obvious to all. Given that there are four kinds of stuff out of which the body has been constructed –

12 For larger discussions of health and disease, both bodily and psychic, see Grams (2009), Prince (2014), and Campbell (2022a).

13 For Plato's theory of replenishment, see Schroeder (2021) and Pelavski (2014).

earth, fire, water, and air – it may happen that some of these unnaturally increase themselves at the expense of the others. Or they may switch regions, each leaving its own and moving into another's regions. Or again, since there is in fact more than one variety of fire and the other stuffs, it may happen that a given bodily part accommodates a particular variety that is not appropriate for it. When these things happen, they bring on conflicts and diseases (82a).

Here, Plato lays out the underlying explanations of bodily diseases: the unnatural behavior of the elements.

For instance, the processes that lead to the replenishment of our flesh can be reversed (82e-83a). The bloodstream naturally feeds flesh when our flesh needs replenishment. However, there are times when the flesh deteriorates and re-enters the bloodstream. The bloodstream will then contain substances that should never be circulating in the human body: a variety of bilious, bitter, acidic, and salty substances, and these are "agents of destruction," as Plato puts it (82e). They move around the body as nourishment does, but they do not supply our tissues with nourishment. After all, they are tissues that have been deteriorated already. Plato writes that these substances "wage a destructive and devastating war against the constituents of the body that have stayed intact and kept to their posts" (83a).

This analysis matters greatly for the soul. Consider epilepsy (85a-b). In the ideal case, our body's white phlegm will not stay within the body and will find a vent to the outside world, where it can be released; this is the best that we can hope for when it comes to white phlegm. The worst case is that it will be sprayed against the "divine circuits in the head" (85a). If this happens, the inner psychic circles whose activity is responsible for *nous* and other cognitive phenomena will be thrown into disarray and confused. When this happens to a person who is awake, it is known as *epilepsy*. This example is further evidence that Plato thinks of the soul as something that is spatially extended and able to come into contact with bodily substances, such as phlegm. In this case, we see the soul being splashed with phlegm.

All psychic diseases are analysable this way, namely, in terms of interactions between the soul and bodily substances that are not where they should be. At *Ti.* 86b, Plato writes the following words: καὶ τὰ μὲν περὶ τὸ σῶμα νοσήματα ταύτῃ συμβαίνει γιγνόμενα, τὰ δὲ περὶ ψυχὴν διὰ σώματος ἕξιν τῇδε. It is not obvious how we should translate them. I have elsewhere argued that the correct translation is this: 'whereas the diseases

of the body happen to come about in the way just described, the diseases of the soul come about on account of a condition of the body in the following way.'[14] Historically, English-language translators have overwhelmingly preferred the following translation: 'whereas bodily diseases happen to come about in the preceding way, those diseases of the soul that are due to the body arise in the following way'.[15] The difference is that the traditional translation allows for there to be psychic diseases that *do not* come about on account of the body. My revised translation implies that all psychic diseases arise from some bodily condition.[16] This paper is not the right venue for litigating this issue, but it suffices to say here that Plato thinks that the body is either *the* source of psychic disorders or is *a* source of them.

Epilepsy is one example. In the first section above, we saw other examples:

> And as for pains, once again it is the body that causes the soul so much trouble, and in the same ways. When any of a man's acid and briny phlegms or any bitter and bilious humors wander up and down his body without finding a vent to the outside and remain pent up inside, they mix the vapor that they give off with the motion of the soul and so are confounded with it. So they produce all sorts of diseases of the soul, some more intense and some more frequent than others. And as they move to the three regions of the soul, each of them produces a multitude of varieties of bad temper and melancholy in the region it attacks, as well as of recklessness and cowardice, not to mention forgetfulness and stupidity [*dusmathias*] (86e-87a).

Again, we see the idea that there are forces in the body that can travel to places that they should not be. They are responsible for the different vices that correspond to the different kinds of soul that a human has. Here, Plato identifies bad temper, melancholy, recklessness, cowardice, forgetfulness, and stupidity. Later in the *Timaeus*, he talks about the way that an

---

14 See Campbell (2022b) for my argument that this is the correct translation. See also Lautner (2011) for another discussion of psychic disorders.

15 For instance, Lamb (1925), Jowett (1875), Zeyl (2000), and Waterfield and Gregory (2009) prefer the second translation.

16 Robinson (2000), p. 40, agrees with the older translation, and so does Price (1995), p. 86, as well. Cornford (1935), pp. 344–346, has a translation that renders the sentence in roughly same way as I do, ('disorders of the soul are caused by the bodily condition in the following way'), but then interprets the text differently: 'it is not stated that all mental disorders are solely due to bodily states'.

abundance of marrow, or semen, seeping through the bone and moistening the rest of the body results in the pathological and excessive desire for sex (86d-e).

Disease can frustrate the soul's good functioning in this way. It can change our temperaments and make us forgetful. It can make us stupid, cowardly, or reckless. This pushes us to explore the nature of health: what it is, how we achieve it, and how it helps to preserve our soul's cognitive life. In the first place, health is the state of our bodies in which homeostasis is maintained. For Plato, this involves the replenishment of depleted tissues by means of resources obtained from food and drink. The needed resources must go to the places where they are needed in the appropriate quantity in order for our bodies to be healthy. We can ensure that this happens by engaging regularly in exercise. In fact, ideally, we would *always* be exercising.

Plato defends exercise along the following lines:

> the various bodily parts should also be looked after in this same way, in imitation of the structure of the universe. For since the body is heated and cooled inside by things that enter it and is dried and moistened by things outside of it and made to undergo the consequent changes by both of these motions, it will happen that when a man subjects his body to these motions when it has been in a state of rest, the body is overcome and brought to ruin. But if he models himself after what we have called the foster-mother and nurse of the universe and persistently refuses to allow his body any degree of rest but exercises and continually agitates it through its whole extent, he will keep in a state of natural equilibrium the internal and the external motions. And if the agitation is a measured one, he will succeed in bringing order and regularity to those disturbances and those elemental parts that wander all over the body according to their affinities in the way described in the account we gave earlier about the universe (*Ti.* 88c-e).

There is much here that requires unpacking. First, we should highlight what Plato says at the end: exercise ensures that the elements that circulate in the body go to the right place by complying with the rules of nature that govern their motions. After all, the violations of these rules and the *unnatural* motions of the elements that cause disease to arise.

Secondly, we ought to attend to the important point that exercise is an imitation of what Plato here calls the foster-mother and nurse of the

universe. This is his way of talking about the cosmic receptacle in which *everything that comes to be* comes to be.[17] The argument that he is making is that just as there is a part of who we are – namely, our reason – that ought to imitate the noetic activities of the world's soul by reproducing in us the same kind of inner psychic order that exists in the world's soul, our body ought to imitate the motions of the receptacle. Just as the receptacle is in constant motion, so too should our bodies be. The complete human being, both body and soul, ought to imitate the complete cosmos, both body and soul.[18]

The key to understanding this cosmological approach to exercise lies in Plato's discussions of the pre-cosmic movements of the receptacle. Consider the following:

> Now as the wetnurse of becoming turns watery and fiery and receives the character of earth and air, and as it acquires all the properties that come with these characters, it takes on a variety of visible aspects, but because it is filled with powers that are neither similar nor evenly balanced, no part of it is in balance. It sways irregularly in every direction as it is shaken by those things, and being set in motion it in turn shakes them. And as they are moved, they drift continually, some in one direction and others in others, separating from one another. They are winnowed out, as it were, like grain that is sifted by winnowing sieves or other such implements. They are carried off and settle down, the dense and heavy ones in one direction, and the rare and light ones to another place (*Ti.* 52d-53a).

In this passage, Plato says that the random motions of receptacle, identified at the start of the passage as the wetnurse of the becoming, produce states of affairs akin to what a winnowing basket produces. Winnowing baskets sort things out in a like-to-like way: the dense and heavy go together, and the rare and light go together. The elements behave the same way: they coalesce in a like-to-like sort of way. They do not always do this, of course: after all, in our body, sometimes an element does not go to where it is appropriate.

---

17 The nature of the receptacle in the *Timaeus* is a deeply vexed question among scholars; I recommend Algra (1995), pp. 72-121, and Brisson 2011 for surveys and discussions of various views.

18 See Armstrong (2004) and Mahoney (2005) for discussions of assimilation to the world's soul, which is treated alongside assimilation to God, since the world is characterized as divine in the *Timaeus*.

Remarkably, the motions of the receptacle are *random. Random motion* produces these results. Now, of course, Plato believes that the whole cosmos is guided by intelligence; that is an important doctrine in the *Timaeus* and is the central focus of the tenth book of the *Laws*. What the winnowing-basket shows is that there are predictable outcomes of random motions even in the absence of intelligence: namely, like-to-like coalescence. In this respect, Plato is channelling Democritus, who reportedly said:

> Creatures flock together with their kind, doves with doves, cranes with cranes, and so on. And the same happens even with inanimate things, as can be seen with seeds in a sieve and pebbles on the sea-shore (DK B164).[19]

Democritus believes that there are these like-to-like coalescences even without intelligence. Democritus and Leucippus, his fellow atomist, believed, as the targets of *Laws* X do, that corporeal things and their properties exist prior to intelligence. Even before intelligence has come to be, there are still like-to-like motions.

What Plato and Democritus have in common is this: the belief that *random motions result in like-to-like coalescence.* For this reason, the winnowing-like motions of the cosmic receptacle result in like-to-like groupings of elements, and *the random agitations of the body in exercise* similarly result in elements grouping in a like-to-like way. These like-to-like motions are natural, and health is achieved and preserved by the elements moving naturally. On these grounds, Plato concludes that exercise is good for us.

However, he does not think that we merely need to exercise. We also need to preserve the correct proportion between our body and soul. If we exercise our body without training our soul, we are doomed just as surely as if we had trained our soul but never exercised our body (88b-c). At the heart of this is the belief that our body exists to serve our soul: this is true in many ways, but one prominent way is as the soul's vehicle (44d-e). Our body helps us get around. Surely, teachers know this well: teaching is physically draining. If we do not train our body, we will not be able to engage in our pedagogical tasks very well. This is made even more urgent by the fact that diseases can have the wide range of negative effects on our cognition that I pointed out earlier, and health, achieved through exercise, helps keep disease at bay.

19 This translation is by Kirk, Raven, and Schofield (2007), p. 420.

Disease is one threat that our body poses to our soul, and it is thankfully able to be mitigated by exercise. There are, however, threats that are just inevitable and inescapable. Timaeus highlights two such threats: perception and nutrition. Here is how he describes these dangers:

> For mighty as the nourishment-bearing billow was in its ebb and flow, mightier still was the turbulence produced by the disturbances caused by the things that struck against the living things. Such disturbances would occur when the body encountered and collided with external fire (i.e., fire other than the body's own) or for that matter with a hard lump of earth or with the flow of gliding waters, or when it was caught up by a surge of air-driven winds. The motions produced by all these encounters would then be conducted through the body to the soul, and strike against it. (That is no doubt why these motions as a group came afterwards to be called "sensations," as they are still called today.) (*Ti.* 43b-c).

Timaeus develops a picture of embodied psychology in which our inner psychic circles are disrupted by turbulent forces generated by interactions with the external world. As we shall see in the next section, mortals have a different fate in this respect than immortal beings do. The intake of food is one source of psychic disruption for us. Another source is perception. Plato thinks of perception as the result of bodies interacting with our body, creating motions in us that are then conducted to the soul. If the motion does not reach the soul, then there is no perception, because no awareness of the external body has been developed in the soul. Unfortunately for the soul's well-being, receiving such a motion is *violent*:

> They [that is, the motions that strike the soul] mutilated and disfigured the circles in every possible way so that the circles barely held together and though they remained in motion, they moved without rhyme or reason, sometimes in the opposite direction, sometimes sideways and sometimes upside down—like a man upside down, head propped against the ground and holding his feet up against something. In that position his right side will present itself both to him and to those looking at him as left, and his left side as right. It is this very thing—and others like it—that had such a dramatic effect upon the revolutions of the soul. Whenever they encounter something outside of them characterizable as same or different, they will speak of it as 'the same as' something, or as 'different from' something else when the truth is just the opposite, so proving themselves to be misled and unintelligent (43e-44a).

Here, we have a perfectly lucid picture of cognitive disruptions on account of bodily forces. By and large, this is the same type of account as what we saw when thinking about epilepsy and the various vices that come to be on account of interactions between the soul and some bodily force. Instead of bile and phlegm, the perpetrator of the violence against the soul is some motion that is being transmitted through the body from the external world. We end up judging things badly and making mistakes because our soul just is not acting right. Our psychic circles cannot run in the way that they are supposed to, which is the way modelled by the world's soul, whose cognitive activities can never be disrupted or frustrated.

The last point that I shall make here is to briefly say that many of these bad cognitive states naturally arise in childhood (44b-c). Plato thinks that when we are young, our bodies are growing so fast that the nutritive stream is just too violent. Our growth spurts are too intense. In the first place, of course, Plato is explaining something that we all notice about being a human being: we are naturally really bad thinkers when we are younger, even to the point that we are virtually unrecognizable as intelligent beings as newborns, and that we naturally develop intelligence as we get older. The biological explanation for this is that the nutritive stream gradually becomes less intense as our bodies stop growing so fast, and the orbits of the psychic circles can right themselves (44b-c). In parallel with this fact, our digestive system becomes less efficient as we get older, with the result that we cannot even extract the same amount of resources from the same amount food over time; consequently, the nutritive stream gradually becomes weaker in this way too, until we eventually die (81c-e).

5. Human and non-human bodies (and cognition)

In this last section, I shall briefly discuss other kinds of cognition: the cognition that God has, that the world has, that stars have, and that non-human animals have. My discussion picks up on some of the observations about non-human cognition that I made at the end of the first section above.

God, the Demiurge, has or is *nous*. Biological considerations have no place when we think about this divine *nous* because God has no body. There are some scholarly debates about whether the divine *nous* exists even

separately from any soul.[20] I generally agree with those who say that God has or is *nous* but has no soul, but the important point for appreciating the role of biology in Plato's account of cognition is that God has *nous* but no body. One takeaway from this observation is that biology plays a role for some beings but not others. When it comes to mortals, we need to account for our bodies because we have them; this does not mean that an incorporeal entity could not have cognition.

There are some divine entities that *have* bodies, too: the stars, planets, and the whole universe. (From now on, I shall use the term 'star' to capture both the stars and the planets.) Each one of these things is called a god, and each have both *nous* and a body. At *Timaeus* 34b, the whole world is called a god. At *Timaeus* 40d, the planets and stars are referred to as gods. This is, of course, in addition to the Demiurge being called a god (e.g., at *Ti.* 30a). Plato is evidently lax with respect to what he calls a god.[21] These beings have cognition that is different from human cognition. One difference is that the universe is aware of perceptible objects *without having any perceptual organs* (33b, 37b).[22] Plato does not explain how this is possible, but it seems likely that what he means is that the world's soul is aware of perceptible objects by being in contact with them in the sense that the world's soul animates *everything* that exists. That is what is reflected by Plato's usage of the term *to pan* ('everything' or 'the all', literally) to refer to the universe and to that which is ensouled by the world's soul. It has direct contact with the things of which it is aware. Note, however, that this explanation does not solve the mystery of the stars' awareness of perceptual object. As for us who are interested in Plato's biology, this is something we should note: beings with different bodies can have profoundly different forms of cognition than we humans do.

Another difference is that the world's body, as well as the bodies of stars, do not get sick and they do not need food (33d-34a). Since these beings are free from disease, nutrition, and perception, their bodies *do not disturb their cognition at all.* They have the luxury of continuous, uninterrupted perfect cognition. Mortal bodies are different from these divine bodies on

20 See Menn (1995) for the classic study of this question and a decisive argument that the Demiurge's *nous* exists independently of any soul.

21 See Hackforth (1936), pp. 4-5. See also Gerson (1990), 33, who says that Plato is "more than liberal in his use of *theos* and *theios* [i.e., 'divine'], employing them for every significant entity in his philosophy."

22 See Reydams-Schils (1997), p. 263, for more. For a general discussion of the world's cognition, see Betegh 2018 and Corcilius 2018.

account of their creators. At the start of this paper, I observed that our bodies are not made by the Demiurge, but instead by his assistants *at his behest*. Our cognition is structurally similar to divine cognition because the rational kind of soul that exists in our human is made by the Demiurge, but our bodies are made by his servants. These servants lacked access to same materials that the Demiurge had access to when putting together the bodies of the world and the stars. The Demiurge bonded the parts of those bodies using such things as friendship (32b-c). In contrast, the lower gods had access only to the four elements. Accordingly, they put the body together using the elements – and then bonded the elements together *using the elements*. Specifically, they made small rivets from the elements themselves (43a). These rivets were not perfect binding agents, and the fact that, in our case, unlike in the case of the world, there is an environment external to our bodies spells doom for us. The result is that our bodies naturally deplete. For this reason, the gods invented the replenishment system that I outlined above. Even then, the replenishment system is not perfect: eventually, we die of natural causes, if not something else, when our digestive system becomes too inefficient at extracting resources from food; plus, the nutritive stream itself disrupts our cognition. Consequently, our bodies are imperfect and pose real threats to our cognition in a way that the divine bodies do not.

Above, I discussed the bodies of non-human animals. This passage stood out as particularly important:

> Land animals in the wild, moreover, came from men who had no tincture of philosophy and who made no study of the universe whatsoever, because they no longer made use of the revolutions in their heads but instead followed the lead of the parts of the soul that reside in the chest. As a consequence of these ways of theirs they carried their forelimbs and their heads dragging towards the ground, like towards like. The tops of their heads became elongated and took all sorts of shapes, depending on the particular way the revolutions were squeezed together from lack of use. This is the reason animals of this kind have four or more feet. The god placed a greater number of supports under the more mindless beings, so that they might be drawn more closely to the ground. As for the most mindless of these animals, the ones whose entire bodies stretch out completely along the ground, the gods made them without feet, crawling along the ground, there being no need of feet anymore (91e-92b).

The most important part of this passage for our purposes is the description of the heads of these terrestrial animals: they are elongated. These oblong heads are worse for our cognition than round heads. Best of all, of course, would be to have the sorts of bodies that the stars and world have, but being human is much better than being a cow or snake.

Throughout this paper, we have seen examples of the gods striving to make our bodies *appropriate* to the soul that it houses. That is why, for instance, our heads are round. Of course, there are glaring imperfections: consider the way that our bodies deteriorate and can become diseased. These imperfections reflect the defects of our creators, but they never indicate our creators' malevolent intentions. Our rebirths as animals might seem to be malevolent, however, and might indicate a blatant disregard for what is appropriate to us. I disagree with this interpretation. The body of the cow reflects that the person who is now a cow once cared too much about the world. That is why their head hangs forever low to the ground. Along similar lines, think about the way that he describes birds:

> As for birds, as a kind they are the products of a transformation. They grow feathers instead of hair. They descended from innocent but simple-minded men, men who studied the heavenly bodies but in their naivete believed that the most reliable proofs concerning them could be based upon visual observation (91d-e).

If I am reborn as a bird, it is on account of the way that I live my life now. In *that* sense, being a bird is appropriate to me. I simply spent too much time staring at the planets without ever thinking about the intelligible reality that they represent. The same goes for people who are reborn as fish: "the justly due reward for their extreme stupidity is their extreme dwelling place" (92b-c). There is appropriateness here too.

Of course, this might appear to be a different kind of appropriateness than what we observe when considering the roundness of our heads. When we think about the eschatological dimension of Plato's biology, the moral considerations are brought into the foreground. The gods now take interest in rewards and punishments. There is a sense in which this really does represent a new kind of appropriateness, but in another sense, Plato is simply *filling out* and enriching the concepts that his biological system deploys. The richness of Plato's biological system lies in not just the sort of answers that it gives us but also in the kinds of questions that it asks: among others, moral and eschatological questions.

Bibliography

Algra, Keimpe (1995): *Concepts of Space in Greek Thought*. Leiden: Brill.

Armstrong, John M. (2004): "After the Ascent: Plato on Becoming Like God". Oxford Studies in *Ancient Philosophy* 26: pp. 171-183.

Betegh, Gábor (2018): "Cosmic and Human Cognition in the *Timaeus*". In: Sisko, John (ed.), *Philosophy of Mind in Antiquity*, London: Routledge, pp. 120-140.

Brisson, Luc (1997): "Plato's Theory of Sense-Perception in the *Timaeus*: How It Works and What It Means". *Proceedings of the Boston Area Colloquium in Ancient Philosophy* 13: pp. 147-176.

---- (2011): "La 'matière' chez Platon et dans la tradition platonicienne". In: Giovannozzi, D. and Veneziani, M. (eds.), *Materia: XIII Colloquio Internazionale*, Firenze: Leo S. Olschki, pp. 1–40.

Campbell, Douglas R. (2022a): "Located in Space: Plato's Theory of Psychic Motion". *Ancient Philosophy* 42: pp. 419-442.

---- (2022b): "The Soul's Tomb: Plato on the Body as the Cause of Psychic Disorders". *Apeiron* 55: pp. 119-139.

---- (2022c): "The Soul's Tool: Plato on the Usefulness of the Body". *Elenchos* 43: pp.7-27.

Carone, Gabriela R. (2005): "Mind and Body in Late Plato". *Archiv für Geschichte der Philosophie* 87: pp. 227-269.

Collins, Derek (2008): "Mapping the Entrails: The Practice of Greek Hepatoscopy". *American Journal of Philology* 129: pp. 319-345.

Cornford, Francis (1935): *Plato's Cosmology: The Timaeus of Plato*. Indianapolis: Hackett Publishing Press.

Corcilius, Klaus (2018): "Ideal Intellectual Cognition in *Timaeus* 37A2-C5". *Oxford Studies in Ancient Philosophy* 54: pp. 51-107.

Fronterotta, Francesco (2007): "Carone on the Mind-Body Problem in Late Plato". *Archiv für Geschichte der Philosophie* 89: pp. 231-236.

Galen (2013): "The Capacities of the Soul Depend on the Mixtures of the Body". In: Singer, P.N. (ed.): *Galen: Psychological Writings*. Cambridge, Cambridge University Press, pp. 330-424.

Grams, Laura (2009): "Medical Theory in Plato's *Timaeus*". *Rhizai* 6: pp. 161-192.

Gill, Christopher (1997): "Galen vs. Chrysippus on the Tripartite Soul in *Timaeus* 69–72." In: Brisson, Luc, and Calvo, Tomás (eds.): *Interpreting the Timaeus-Critias: Proccedings of the IV Symposium Platonicum: Selected Papers*, Sankt Augustin: Academia Verlag, pp. 267–73.

---- (2000): "The Body's Fault? Plato's Timaeus on Psychic Illnesses". In: Wright, M.R. (ed.): *Reason and Necessity: Essays on Plato's Timaeus*. London: Duckworth and the Classical Press of Wales, pp. 59-84.

Gerson, Lloyd (1990): *God and Greek Philosophy: Studies in the Early History of Natural Theology*. New York: Routledge.

---- (2005): *Aristotle and Other Platonists*. Ithaca: Cornell University Press.

---- (2014): *From Plato to Platonism.* Ithaca: Cornell University Press.

Hackfoth, Reginald (1936): "Plato's Theism". *Classical Quarterly* 30 1: pp. 4-9.

Jowett, Benjamin (1875): *Dialogues of Plato.* Oxford: Oxford Clarendon Press. Second edition.

Karfik, Filip (2005): "What the Mortal Parts of the Soul Really Are." *Rhizai: A Journal for Ancient Philosophy and Science* 2: pp. 197–217.

Kirk, G.S., Raven, J.E., and Schofield, M. (2007): *The Presocratic Philosophers.* Cambridge: Cambridge University Press.

Lamb, W. R. M. (1925): *Plato in Twelve Volumes.* Cambridge, MA: Harvard University Press.

Lautner, Peter (2011): "Plato's Account of Diseases of the Soul in *Timaeus* 86B1-87B9". *Apeiron* 44: pp. 22-39.

Mahoney, Timothy (2005): "Moral Virtue and Assimilation to God in Plato's *Timaeus*". *Oxford Studies in Ancient Philosophy* 28: pp. 77-91.

Menn, Stephen P. (1995): *Plato on God as Nous.* Carbondale: Southern Illinois University Press.

Moss, Jessica (2011): "Pictures and Passions in Plato's *Timaeus* and *Philebus*". In: Barney, Rachel, Brennan, Tad, and Brittain, Charles (eds.): *Plato and the Divided Self*, pp. 259–80. Cambridge: Cambridge University Press.

Pelavski, Andres (2014): "Physiology in Plato's *Timaeus*: Irrigation, Digestion, and Respiration". *Cambridge Classical Journal* 60: pp. 61-74.

Price, A. W. (1995): *Mental Conflict.* London: Routledge.

Prince, Brian D. (2014): "The Metaphysics of Bodily Health and Disease in Plato's *Timaeus*". *British Journal for the History of Philosophy* 22: pp. 908-928.

Reydams-Schils, Gretchen (1997): "Plato's World Soul: Grasping Sensibles Without Sense-perception". In: Brisson, Luc, and Calvo, Tomás (eds.): *Interpreting the Timaeus-Critias: Proceedings of the IV Symposium Platonicum,* Sankt Augustin: Academia Verlag, pp. 261-265.

Robinson, Thomas (2000): "The Defining Features of Mind-Body Dualism in the Writings of Plato". In: Wright, J.P., and Potter, P. (eds.): *Psyche and Soma: Physicians and Metaphysicians on the Mind-Body Problem from Antiquity to Enlightenment,* Oxford: Clarendon Press, pp 37-55.

Schroeder, Lea Aurelia (2021): "Replenishment and Maintenance of the Human Body". *Apeiron* 54: pp. 317-346.

Stalley, R.F. (1996): "Punishment and the Physiology of the *Timaeus*". *Classical Quarterly* 46: pp. 357-370.

Waterfield, Robin, and Gregory, Andrew (2009): *Timaeus and Critias.* Oxford: Oxford University Press.

Wilburn, Joshua (2014): "The Spirited Part of Soul in Plato's *Timaeus*". *Journal of the History of Philosophy* 52: pp. 627-652.

Zeyl, Donald J. (2000): *Plato's Timaeus.* Indianapolis, Indiana: Hackett Publishing Company.