

from obvious that the biological explanations treat facts about matter as primitive. I offered the following three considerations.

First, from Aristotle's discussions in *PA* II.1, it would seem that matter at the lowest level of composition – an organism's bodily blend or *krasis* – is not primitive, at least not if one accepts that citing what something is for the sake of entails that it is explained. Second, there is reason to think that certain appeals to *krasis* are not intended as references to primitive facts. For Aristotle correlates facts about a kind's *krasis* with facts about human rationality. If human rational capacities are part of human essence, this would render the coordination between essence and matter a coincidence. But I do not think that this can be Aristotle's view. Third and finally, I have tried to indicate the way in which Aristotle's conception of the metabolic processes – the heating and cooling involved in reproduction, development, and maintenance – imbeds the actions of the elemental powers into the activity of the soul or form of the organism. Heat and cold are tools by which soul activities are carried out. This bars them from being "independently" operative in the way that has been suggested in the recent literature.

CHAPTER 4

Blood, matter, and necessity

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According to most scholars, in the *Parts of Animals* Aristotle frequently provides explanations in terms of material necessity, as well as explanations in terms of that for the sake of which, that is, final causes.¹ This material necessity is not supposed to be the necessity from a hypothesis that Aristotle describes in *Physics* II.8, which involves the necessity of matter given some end, but rather a type of necessity that results directly from matter, for example, the necessity of fire to heat. Aristotle says in the first chapter of the *Parts of Animals* that he is looking for two causes, the "of necessity" and the "that for the sake of which" (642a1–3), and he follows through on this in the rest of the *Parts of Animals*, frequently bringing his explanations back to these two causes. But he never uses the phrase "material necessity." It is a substantive interpretation that matter is connected to necessity in this way.

In this chapter, I argue that we misunderstand both matter and the way that Aristotle explains things using necessity if we interpret Aristotle as explaining things in terms of material necessity.² In the first half of the chapter, I provide an account of how Aristotle uses the term "matter" in the *Parts of Animals*. He does not use it very frequently in his detailed discussions of animal parts; when he does use it, he typically identifies blood as matter. The reason for this, I argue, is the following. Blood is, for Aristotle, what properly nourishes and grows the other parts of the body and he views nourishment and growth as types of coming to be. Matter, for Aristotle, is what comes-to-be other things and hence what nourishes and

I have received valuable feedback from Devin Henry, Northwestern's Junior Faculty Working group, UW-Milwaukee, The Greeks at UW-Madison, the conference "Theory and Practice in Aristotle's Natural Philosophy" at Northwestern, and at the "New Directions" workshop at Rutgers.

¹ Lennox 1987, Gill 1997, Henry 2007, and Leunissen 2010 (*passim*). This is separate from the view Gelber discusses in this volume that there are primitive facts about matter. However, these views are typically found together and naturally complement one another: there are primitive facts about matter and these are necessary facts.

² Lennox's (1987), Henry's (2007), and Leunissen's (2010) projects are not primarily focused on matter or necessity. So, even if I am right, this need not cause major problems for their overall projects.

grows the parts of the body will be a type of matter. Blood, for Aristotle, can nourish or grow different animal parts and so, rather than necessitating a particular outcome, it is open to very different results.

The second half of the chapter turns to necessity as a cause in the *Parts of Animals*. How should we understand this, if we do not think of it as having a special connection to matter? I argue that sometimes this necessity is the result of agent and patient coming together. But in other cases the necessity follows from a thing's essence or is a sort of conceptual truth. Aristotle does not distinguish between these different sorts of necessity in the *Parts of Animals*. In fact, he shows no interest in analyzing the types of necessity involved in his detailed biological explanations. Instead, he views his task as complete once he has brought a question back to a necessity as a cause (perhaps along with a final cause). The term "material necessity" obscures the unusual sort of cause he is giving in the *Parts of Animals*: undifferentiated necessity.

Blood and matter in the *Parts of Animals*

It is important not to allow our ordinary ideas about matter to influence how we understand matter in Aristotle. The term we translate as "matter," *hylē*, originally meant trees, wood, or lumber. The only extant use before Aristotle to mean something roughly like matter is a single occurrence in Plato's *Philebus* (54c). Aristotle certainly developed his notion of *hylē* using related ideas from his predecessors, and perhaps other people were developing ideas about *hylē* in the Academy. Nonetheless, Aristotle was at the forefront of developing a new concept, one that he says in *Metaphysics A* was not properly grasped by any of his predecessors (985a9–17 and 993a11–17). It is not clear how close our current ideas about matter are to the one that Aristotle thought was crucial for understanding the natural world.

Given this, it is useful to work our way up from the passages where Aristotle uses the term *hylē*. Aristotle only uses the word 30 times in the *Parts of Animals*; 15 of them are in the first, theoretical, book; 5 of them are in the first page of book II, chapter I, leaving only 10 occurrences in the rest of books II–IV, where Aristotle provides his detailed discussion of animal parts.³ This is compared to 68 occurrences in the *Generation of Animals*. Moreover, in 7 of the last 10 occurrences, the matter in question is identified as blood.

³ Based on searches in the TLG.

Why does Aristotle generally identify blood as matter in his detailed discussion of animal parts? While there are complications, the basic reason is this: matter, for Aristotle, is intimately tied with change. In particular, the matter for some change is what properly speaking undergoes that change. I argue elsewhere that this is the correct interpretation of matter in Aristotle's *Physics* book I.⁴ In brief, Aristotle motivates the need for matter in *Physics* I by arguing that in every change there must be something that properly undergoes the change. This is why he says in *Phys.* 1.7 that things come to be from matter not by virtue of concurrence (190b24–27). In this chapter I simply argue that what we find in the *Parts of Animals* fits with this view. Blood, according to Aristotle, is produced by the body precisely to be something that can come-to-be each of the internal organs and uniform parts. Matter plays a more prominent role in the *Generation of Animals* because generation is central to that work.

Blood is the first part that Aristotle discusses in the *Parts of Animals*.⁵ He begins his discussion of blood in *PA* II.2, but says that to discuss it he first must discuss heat and the opposites dry and moist, since blood is hot and moist. He concludes this preliminary discussion, in II.3, with the claim that blood is the final nourishment in blooded animals (bloodless animals, he thinks, have an analogue to blood). There is the nourishment that we take into our bodies as food. But this must be concocted, with heat, in the stomach, until it is in the form of this final nourishment. Blood, he says, is for the sake of nourishing. Blood's moisture and heat are not independent features of it; it nourishes because it is moist and hot.⁶

Aristotle thinks that some of an organism's differing characteristics are explained by different types of blood: some animals have a subtle intelligence because of thin and pure blood; timid animals have watery blood; those with fibrous thick blood are more spirited (648a2–11; 650b19–651a5). Near the end of discussing this feature of blood he connects it to matter:

The nature of the blood is the cause of many features of animals with respect to both character and perception, as is reasonable, since blood is the matter of the entire body; for nourishment is matter and blood is the last stage of nourishment. (651a12–15)⁷

⁴ See Ebrey 2007 and Ebrey (unpublished) "Distinguishing Matter from Lack in *Physics* I." See also Alan Code's contribution in this volume, which discusses Aristotle's view of matter in *Metaphysics H* and is complementary to my own.

⁵ Chris Frey (forthcoming), "From Blood to Flesh: Homonymy, Unity, and Ways of Being in Aristotle," *Ancient Philosophy*, section 1, argues that Aristotle's considered view is that blood is not a part. For my purposes, it does not matter whether it is a proper part or merely a part-like thing.

⁶ For a short, complementary discussion of blood in Aristotle, see Freeland 1987, p. 401.

⁷ Translations from Lennox 2001a, occasionally lightly revised.

Aristotle says that blood is the matter for the entire body because it is nourishment for the body. In order to explain why blood's being nourishment qualifies it as matter, we need to understand Aristotle's theory of nourishment. In the *Parts of Animals* he refers us to discussions of nourishment (650b10, 668a8–9). This may refer, in part, to a lost treatise; however, there is a discussion in *Generation and Corruption's* chapter on growth (I.5) and a more extensive discussion of nourishment throughout book II of *Generation of Animals* (especially II.4, II.6, and II.7).⁸ Nourishment is treated as fundamentally similar to growth (e.g., *GC* I.5, 322a23–28). In both cases, the body takes something into it. Normally, if something enters a body, it is simply a foreign body. But in growth or nourishment, the thing that is brought in becomes part of the new thing. Thus, growth and nourishment are both types of coming to be. The difference is that in growth there is a change of size, whereas in nourishment the thing does not change in size (typically, one imagines, because waste is also produced).

Blood is concocted to be the body's nourishment. But, in fact, it is more than that. The organs themselves come to be from blood, as we can see in the following passage from *PA* III.5, Aristotle's chapter on blood vessels:

A cause of the blood vessels being distributed over the entire body is that the blood and its analogue in bloodless animals are matter for the entire body, while these are stored in blood vessel and its analogue. As to how and from what animals are nourished, and in what manner they absorb nourishment from the gut, it is more appropriate to investigate and speak about such things in the works on generation. And since the parts are constituted from the blood, as we said, it is reasonable that the course of the blood vessels runs naturally through the entire body; for the blood too needs to be passing through everything and next to everything, if each of the parts is to be constituted from it. (668a1–11)

At the beginning of the passage we see that the fact that blood is matter for the entire body explains why we have blood vessels throughout our entire body. And at the end of the passage we are told that each of the parts is constituted by blood.⁹ Thus, blood constitutes, nourishes, and grows the parts of the body. In *GA* IV.1 Aristotle ties this to a more general principle:

⁸ For a discussion, see Lennox 2001a, pp. 200–1.

⁹ Note that Aristotle thinks that different types of blood are involved in different types of change.

Since it is the same, that out of which something comes to be and grows, namely the nourishment, each of the parts comes to be out of that sort of matter and that sort of residue which it is fitted to receive. (766a10–13)

Note, then, that blood is quite open to possibility for Aristotle – blood can come to be, nourish or grow a number of different parts; on its own, blood does not necessitate any particular action.

We have seen that in the detailed discussion of parts in the *Parts of Animals* Aristotle typically identifies matter as blood. This is what the body concocts to properly nourish and grow the uniform parts. In general, things properly come to be from matter and Aristotle thinks that the body only concocts one thing to play that role: blood. However, there are a few cases in the detailed discussion in the *Parts of Animals* where something other than blood is identified as matter. There is the case of birds lacking ear-matter considered in the next section of this chapter. For now, let us consider passages from the beginning of book II that suggest a progressively broader scope for matter. Near the beginning of Aristotle's discussion of blood he suggests a somewhat broader scope for matter:

First of all, then, many modes of cause may be attributed to the moist parts and the dry. Some of them serve as matter for the non-uniform parts (since each of the instrumental parts has been constituted from these, i.e., from bones, sinews, flesh, and other such parts, some contributing to the *ousia* [substance, being] of the instrumental parts, some to their operation); some of the moist parts are nourishment for the non-uniform parts (for all derive their growth from what is moist); and some of them turn out to be residues, such as the sediment from dry nourishment and, in those with a bladder, from moist. (647b20–29)

Bones, sinew, flesh, and other parts are described as matter, and put alongside the moist parts that are nourishment. Since blood is a moist part that is nourishment, this might even suggest that blood is not matter, although Aristotle does not actually say this (and it contradicts what he says later in the chapter).¹⁰ Aristotle's account seems to be the following: blood is the matter for the uniform parts and nourishes all parts, whereas the other uniform parts (such as bones, etc.) are, in turn, matter for arms, legs, etc. When blood nourishes the arm, it does so by nourishing the uniform parts, such as flesh, that constitute the arm.

¹⁰ At the beginning of *GA* I.1 all parts are described as matter.

This leaves us with a question: If bones and sinews are matter for the non-uniform parts, why does Aristotle not mention this in his discussion of bones and sinews? Why is blood repeatedly referred to as matter in the *Parts of Animals*, and not these uniform parts, if they are also matter? The reason is that there is something special about blood: its nature is to come to be something else. The other parts are not as intimately tied to coming to be as blood. While these parts do play a role in the coming to be of the whole organism, their primary function is not to play this role. Their primary function is determined by their function in a fully formed organism. One can provide an account of bone without mentioning that it is matter, in a way that one cannot do with blood. The primary function of blood is to generate, maintain, and grow the parts, and these are all types of coming to be. For blood to be fully developed is for it to be primed to come to be something else, unlike with the other parts.

On this account, something is matter to the extent that it is playing a certain role.¹¹ When Aristotle is describing something, but not as part of this role, he is not describing it insofar as it is matter. Aristotle would not tack onto his description of the liver that it is matter for the organism. This is not relevant to the sort of part-by-part description he gives in the *Parts of Animals*. But when Aristotle asks whether he has discussed the matter of the organism (as he does at the beginning of *GA* I.1), he can say that he has. This is one important reason for us not to systematically redescribe Aristotle's biological works using the term "matter" in places where he does not use this term. Aristotle almost always uses the term when it is relevant to the discussion that the thing is functioning *as* matter. When you describe something as matter out of context you can mistakenly ascribe features to it that do not hold insofar as it is matter.

There is a question remaining for this account: Does calling the (non-uniform) parts matter undermine the idea that matter is what something properly speaking comes to be from? After all, it is not clear that wholes come to be from their parts. This, in short, is Ackrill's classic puzzle about matter.¹²

Aristotle's view in the *Parts of Animals* is that things do, in fact, come to be from their parts. The generation of animals involves the successive generation of their parts until the whole organism is formed. Thus, here too matter is what a thing comes to be from. We can see that Aristotle is committed to such a view at the beginning of *PA* II.1. Let us examine this passage both (1) to finish our discussion of parts as matter, and (2) to turn

¹¹ For a similar account, see Code's chapter in this volume, section 2. ¹² Ackrill 1972/73.

to a new topic, the idea that matter is for the sake of what it becomes. Here is the passage:

In generation things are opposed to the way they are in being (τῆς οὐσίας); for things posterior in generation are prior in nature, and the final stage in generation is primary in nature. For instance, a house is not for the sake of bricks and stones, but rather these are for the sake of the house – and so it is with other matter. Not only is it apparent from a consideration of cases that this is the way things are, but it also accords with our account; for every generated thing develops from something and into something, i.e., from an origin to an origin, from the primary mover which already has a certain nature to a certain shape or other such end. For a human being generates a human being, and a plant a plant, from the underlying matter of each. So the matter and the generation are necessarily prior in time, but in account the being and the shape of each thing. This would be clear if someone were to state the account of the generation of something; the account of housebuilding includes that of the house, while that of the house does not include that of housebuilding. And so it is in the other cases as well. Thus the matter of the elements is necessary for the sake of the uniform parts, since these are later in generation than the elements, and later than the uniform are the non-uniform; for these have already attained their end and limit, having achieved a constitution of the third sort, as often happens when generations are completed.

Thus animals have been constituted from both of these parts, but the uniform parts are for the sake of the non-uniform . . . (646a24–b12)

As one would expect from the account of matter I provided above, Aristotle identifies matter as what things come to be from. He then infers from this that matter is prior in time to what it constitutes. One might wonder whether flesh really does develop prior in time to the parts constituted by flesh. But Aristotle's position in this passage is that it does. Given that he thinks of matter as what things come to be from, we can see why he would naturally think that it is prior in time to what it constitutes.

So far in this section we have seen no connection between matter and necessity in the *Parts of Animals*. The claim that matter is for the sake of something provides a further reason to be wary of reading a connection between matter and necessity. In some places, notably *GA* v, Aristotle claims that things can be necessary without being for the sake of anything. These are sometimes taken to be clear cases of material necessity.¹³ But then, given what we have seen above, to precisely that extent they should not be due to matter, because matter *is* for the sake of something. One might want to say that iron is matter for the saw, but it is not for the sake of the

¹³ For example, Leunissen 2010, p. 141.

saw. However, this is not Aristotle's view; in describing it as matter, we are describing it as for the sake of the saw. Aristotle says in the above passage that the bricks and stones are for the sake of the house, *and so it is with other matter*. Blood, in particular, is said to be for the sake of nourishment and growth. Thus, we should not think of any and all things explained non-teleologically as explained materially. On the contrary, Aristotle thinks that matter is teleological.

To summarize, on the few occasions when Aristotle mentions matter in providing his detailed accounts of animal parts, it is mostly identified as blood, because it is from this that the parts of animals nourish and grow. While other parts can be described as matter, this is not central to their function as a part. Matter is prior in time to what it becomes and for the sake of this thing.

Necessity

As mentioned earlier, in *PA* 1.1 Aristotle says that we should look for two causes: the from-necessity and that for the sake of which (642a1–2). He goes on to do just this throughout the *Parts of Animals* and the *Generation of Animals*. The examples are ubiquitous.¹⁴ In addition to identifying necessity as a cause, he uses it along with causal language, such as the use of *dia* with the accusative (because of). Cause (αἰτία) and related words show up 164 times in the *Parts of Animals*. Scholars often note that it is not clear how closely related *Parts of Animals* book 1 is to books II–IV.¹⁵ This is one way in which the distinctive promises of book 1 are carried out in books II–IV. Someone who just read the *Physics*, say, or *Generation and Corruption* book 1, would not be prepared for the focus in *PA* II–IV on “from necessity” and “that for the sake of which” as causes.¹⁶

This idea of “from necessity” as a cause seems rather strange. We know that Aristotle in many places, including the *Physics*, *Metaphysics*, and the beginning of *Generation of Animals*, says that there are four causes. And in a number of passages he suggests that that for the sake of which is the same as the form and the efficient cause. So this creates natural pressure toward thinking that “necessity” is a stand-in, of some sort, for matter. This seems

to be one of the basic reasons that it is associated with matter.¹⁷ There are other reasons as well, some of which will be touched on below.

My focus will be on providing a positive account of how Aristotle uses from-necessity as a cause. *Phys.* 11.9 leads one to expect that the necessity in the *Parts of Animals* is a type of hypothetical necessity, where something is necessary given the hypothesis that some end is achieved. In fact, in a couple of places in *PA* 1.1 Aristotle suggests this same picture (639b21–640a9, 642a1–13). But, as is frequently pointed out, in most cases it is not this sort of hypothetical necessity that is identified as a cause in *Parts of Animals* II–IV. Instead, he treats certain features of animal parts as due to a more direct form of necessity. The last paragraph of *PA* 1.1 is the only place in the *Parts of Animals* where he seems to provide a general description of this other sort of necessity.¹⁸

One should explain in the following way, e.g., breathing exists for the sake of *this*, while *that* comes to be from necessity because of *these*. But “necessity” sometimes signifies that if that – i.e., that for the sake of which – is to be, it is necessary for these things to obtain, while at other times it signifies that things are thus in respect of things possessed and naturally produced. For it is necessary for the hot to go out and enter again upon meeting resistance, and for the air to flow in. This is directly necessary; and it is as the internal heat retreats during the cooling of the external air that inhalation and exhalation occur. This then is the way of investigation, and it is in relation to these things and things such as these that one should grasp the causes. (642a31–b4)

Notice that we are told that this non-hypothetical sort of necessity comes from things “possessed and naturally produced.” Assuming that this is what Aristotle pursues in the *Parts of Animals* books II–IV, we are left with the question of how and why “things possessed and naturally produced” (ἔχοντα καὶ πεφυκότα) necessitate. In particular, is this necessity directly connected to matter?

In *PA* 1.1, Aristotle treats from-necessity explanations as something everyone agrees to, so he only seems to think that he needs to argue for the final cause. However, it is not clear that he accepts necessity as a cause for the same reason that Democritus or other Presocratics did. Thus, in order to

¹⁴ The noun ἀνάγκη and the adjective ἀναγκαῖον show up 172 times in the *Parts of Animals*. Of course, not all of these uses are related to necessity as a cause.

¹⁵ For example, Lennox 2001a. But Lennox 2010 argues for tighter connection.

¹⁶ Contrast Leunissen 2010, section 4.3, where she treats Aristotle as giving formal and material causes throughout the *Parts of Animals* (on pp. 146–47 she identifies these as the primary causes). On my reading, Aristotle identifies the causes as from necessity and that for the sake of which; he occasionally mentions matter, but he is typically not giving matter as a cause of the feature to be explained.

¹⁷ Monte Johnson in his discussion of *Po. An.* 11.11 (Johnson 2005, Chapter 2, section 3) and of Aristotle's biology (Johnson 2005, Chapter 6, sections 4 and 5) suggests that matter could be a specific case of the from-necessity cause (Johnson 2005). This is a complicated issue that I cannot adequately address here. My own view is that Aristotle may treat from-necessity and matter as different species of that-out-of-which, but matter is not a species of from-necessity, since it does not necessitate. This depends on some tricky issues in Aristotle's difficult *Po. An.* 11.11.

¹⁸ Although, as Scharle points out in her contribution to this volume, at 640a23–b4 Aristotle suggests an important role for non-hypothetical, non-teleological necessity. Her account and discussion complement my own here.

understand how he thinks of necessity as a cause, it is useful to look at some of the actual explanations he gives in books II–IV. Necessity operates as a cause in a number of different ways in the *Parts of Animals*, so we will consider a number of passages to get an overview. Here is a simple case where both necessity and a final cause are cited and causal language is used, but in this case (unlike many others), the word “cause” is not used:

With respect to the head, mankind is the most hairy of animals, from necessity, because of (διὰ) the moistness of the brain and because of (διὰ) the sutures (for where there is much moisture and heat there must be much growth), and for the sake of protection, so that it may provide covering, warding off the extremes of both cold and heat. And since the human brain is the most moist, it is also most in need of this protection; for what is moist boils and freezes most easily, while what is in the opposite state is less easily affected. (658b2–10)

The first question to ask about this sort of passage is why Aristotle thinks that it involves a type of necessity. The things described as necessary in the *Parts of Animals* are generally not strictly necessary, in the sense of impossible to be otherwise. To use the above example, it is not the case that human heads absolutely must be hairy. In Aristotle’s language, this happens for the most part. There could be some sort of blockage in the sutures that does not allow the hair to grow. Moreover, as we know, Aristotle insists that there is no unqualified necessity in the sublunary realm.

These sorts of considerations lead Jacob Rosen to suggest that “necessity” in the *Parts of Animals* means something like compulsion or force – the sort of meaning it seems to have in Plato’s *Timaeus*.¹⁹ However, Lennox points out that this meaning of necessity as compulsion is treated as a special case in *Posterior Analytics* II.11, where Aristotle discusses necessity as a cause.²⁰ But Rosen is right to search for an explanation of why Aristotle thinks of these as cases of necessity. A different solution is suggested by *Generation of Animals*. There the idea is that something results of necessity when the agent and patient, identified as efficient cause and matter, come together. This is likely a shortened version of Aristotle’s idea that when agent and patient come together, so long as nothing interferes, the result comes about of necessity. We find this idea, for example, in *Metaphysics* Theta 5 and *Phys.* VIII.4.²¹ Perhaps when we discuss biology, we are discussing

¹⁹ Rosen 2008, pp. 112–13. ²⁰ Lennox 2001a, p. 149.

²¹ This is not explicitly listed as a separate type of necessity in *Metaphysics* Δ 5, Aristotle’s chapter on necessity. Perhaps it falls under the broader type of necessity that involves not being able to be otherwise. The focus in *GC* II.11 is on the guaranteed necessity of generation – a rather different topic.

how things normally are, in which case nothing is preventing. There are at least three passages in the *Generation of Animals* that suggest necessity resulting from this (731b18–23, 740b21–25, 778a34–b5). Although all three contribute something different, it is sufficient to consider one. One passage is in *GA* II.4; it is Aristotle’s second explanation of why the uniform parts are formed:

When the active thing and the passive thing, when they are in contact, are in the way that the one is acting and the other is being a patient (by “way” I mean the manner, the place, and the time), then immediately (εὐθὺς) the one acts and the other is passive. In this case, it is the female that provides the matter, and the male that provides the principle of movement. (740b21–25)

Aristotle’s point is that in general when agent and patient come together in the right way, they straight away act; thus, this is how things will work in this particular case, where the mother provides the matter (and hence the patient) and the father the efficient cause (and hence the agent). In this passage Aristotle does not explicitly mention necessity, although he does in the other two passages (731b18–23 and 778a34–b5).

Aristotle’s general principle, in *Metaphysics* Theta and *Physics* VIII, is put in terms of agent and patient. He often uses these terms interchangeably with moving cause (i.e., the efficient cause) and matter, although he is more likely to use the terms “moving cause” and “matter” when discussing generation and more likely to use the terms “agent” and “patient” when discussing alteration and locomotion.²² Nonetheless, he does talk about the matter for alteration, locomotion, and growth and he does talk about the agent and patient in generation (as we saw in the previous passage).

There is a type of matter that is relevant to this sort of necessity. It is nonetheless misleading to call it material necessity because that suggests that matter plays a primary role in explaining these changes and results. Instead, the efficient cause is at least as responsible as the matter. Matter, taken on its own, is typically open to different possibilities. Blood can become different organs, or sustain them. It is only when blood is acted on in the right way that it becomes something specific. Moreover, it is worth understanding how Aristotle uses his own explanatory concepts. He almost never uses matter in his detailed explanations of animal parts. Rather, his goal – and what he does – is to trace things back to necessity as a cause. He is not trying to identify matter as a cause.

²² See Code’s contribution to this volume, section 2, for an argument that for Aristotle matter only strictly applies in cases of generation and corruption simpliciter.

The following is an example in the *Parts of Animals* of a from-necessity cause that fits this matter/efficient-cause model:

The kidneys have the most fat of all the viscera. On the one hand, this is out of necessity, because the residue is filtered through the kidneys. For the remaining blood, being pure, is capable of good concoction; and soft and hard fat is an end of well-concocted blood. For just as in dry things that have been burnt, such as ash, some fire is left behind in them, so it is in moist things that have undergone concoction as well; that is, some portion of the heat which was operative is left behind in them. This is why what is oily is light and rises to the surface in liquids. Hence, on account of the visceral body being dense, the fat does not come to be in the kidneys themselves, but surrounds them on the outside, soft in the ones with soft fat, hard in the ones with hard fat. (The differences between these two sorts of fat have been stated previously elsewhere.) So on the one hand it is of necessity – this is the cause owing to which the kidneys come to be fatty, a consequence of what happens of necessity in animals with kidneys; on the other hand, they also come to be fatty for the sake of preservation of the kidneys and of their natural heat. (672a1–15)

Blood is matter for fat. Excess heat acts on the blood and turns it into fat; this process, of blood being heated, is how fat is normally formed (*PA* II.5). Although Aristotle does not do so, we could apply his concepts and say that the heat acts as an efficient cause on the blood, which is the matter. This happens of necessity, given the location of heat and blood. But it also is for the sake of preservation.

Not all cases of necessity fall under this matter/efficient-cause rubric. One example is important; it is the only case in the *Parts of Animals* where Aristotle explicitly mentions matter when giving an of-necessity explanation.

The birds possess only auditory channels [rather than ears], on account of (δύσ) the hardness of their skin and because rather than having hair, they are feathered; accordingly they do not have the sort of matter from which ears may be formed. Likewise too with the four-footed animals that lay eggs and have hard scales – the same account also applies to these. (657a17–24)

While he does not explicitly say that birds lack ears from necessity, he gives the sort of explanation that elsewhere is identified as a from-necessity explanation: he explains why birds don't have something because it is impossible for them to have it, given some feature of them, in this case the hardness of their skin and their having feathers. But here, unlike elsewhere, Aristotle mentions matter. He says that accordingly (οὕτως) they do not have the matter from which ears are formed. His point is that ears are formed

from a certain sort of part, a certain type of skin, which birds lack. This skin is the matter for ears. When explaining why it is necessary that something *lacks* something else, you do not need both matter and an efficient cause. The absence of either matter or an efficient cause explains why the result cannot occur, since both are needed for the result to happen. This is the only way in which matter (on its own) can provide a necessity: a lack of matter can necessitate the lack of something.

This is related to a type of hypothetical necessity. Iron is hypothetically necessary for the saw and so, lacking iron, the saw cannot come to be. Similarly, soft, featherless skin is hypothetically necessary for ears and, lacking such skin, ears cannot come to be. In fact, such explanations are fairly common in the *Parts of Animals*. The cause of an animal lacking some feature is that it does not meet some necessary prerequisite for having the feature.

There are a number of cases of necessity in the *Parts of Animals* that cannot be explained in terms of matter and an efficient cause. We need to examine examples of these before we can pull together Aristotle's views about from-necessity as a cause. Consider this explanation of why birds are two-footed:

They are two-footed of necessity; for the being (οὐσία) of the bird is that of the blooded animals, but at the same time that of the winged animals, and blooded animals do not move by more than four points. Accordingly, the attached parts are four – as in the other locomotive land-dwellers, so too in the birds. But four arms and legs are present in the one group, while in the birds, instead of forelimbs and arms, wings are a common feature; and in virtue of these they are able to stretch out, and the ability to fly is in the being (ἐν τῇ οὐσίᾳ) of the bird. So it remains for them to be, of necessity, two-footed; for in this way they will move, with their wings, by means of four points. (693b5–15)²³

Birds have four limbs because they are blooded animals. But two of these need to be wings, because they are flyers. Thus, of necessity, they are two-footed. Notice that they are not two-footed for the sake of something. They have wings for the sake of something, but they are two-footed because of a combination of various features of their *ousia*. At the same time, these are direct features of their *ousia* that do not directly involve matter or an efficient cause.

Aristotle does not differentiate this sort of explanation from the earlier ones involving blood, heat, and skin: all are categorized as from necessity

²³ See also *PA* IV.9: a single row of suckers is of necessity given the *ousia* of a certain kind of octopus.

and are not further categorized or subdivided. Consider another case from *PA* II.1; this one comes shortly after the passage where he says that matter is temporally prior and for the sake of something. This example is unlike all of the others we have seen:

As being for the sake of something, then – on account of *this* cause – these parts are related in the way stated [uniform parts constitute the non-uniform parts]; but when one also seeks how it is *necessary* that they be thus, it is apparent that they were antecedently so related to one another from necessity. For the non-uniform parts are capable of having been composed from the uniform parts, both from many of them and from one, as with some of the viscera; they are complex in configuration, though generally speaking they are composed of one uniform body. But it is impossible that the uniform bodies be composed from the non-uniform, for the uniform parts would consist of many non-uniform parts. These, then, are the causes owing to which some parts of animals are simple and uniform while others are composite and non-uniform. (646b27–647a2)

After arguing that the uniform parts are for the sake of the non-uniform, Aristotle provides this second argument, giving another cause of the one constituting the other. He offers what we might think of as a conceptual truth: non-uniform parts can consist of uniform parts but uniform parts cannot consist of non-uniform parts. You can compose a complex thing out of simple things, but you cannot compose a simple thing out of complex things. This explanation does not turn on matter, efficient cause, or the *ousia* – except, perhaps, *ousia* at a very high level of generality; it simply has to do with the very notion of a uniform and a non-uniform part.

From these cases, we can conclude that Aristotle does not think there is a single sort of necessity involved in all of these different types of “from-necessity” explanations: it is any necessity that is the result of things “possessed and produced naturally,” as he says in the *PA* I.1 passage. He understands “possessed and naturally produced” quite broadly. Aristotle is content to bring things to necessity and then consider his job done. Why does he not think that to provide a full explanation, he needs to categorize the type of necessity at issue, or to bring things back to the four causes?

Here is one explanation we might be tempted to give: perhaps teleological explanations are important because they are not necessary. Thus, the epiglottis exists *for the sake of* not choking, but it is not necessary in order to not choke (664b20–665a8). There is another way to avoid choking: some animals’ windpipes collapse. If teleological explanation were, in general, not necessary, this would be a good reason for Aristotle to treat these as the two types of explanations. The main problem with this idea is that

some cases of for-the-sake-of causes – the ones that Mariska Leunissen calls primary teleology – are cases where something is both necessary and for the sake of something: it is necessary because it is part of the essence or vitality of the organism.²⁴ Birds have wings for the sake of flying and it is necessary for birds to have wings, given that they are essentially flyers.²⁵ Moreover, as we have seen, in some cases – such as the fat around the kidney – something is both for the sake of something and, for a different reason, necessary.

Here is another explanation that might be tempting: perhaps Aristotle is primarily interested in what each of the parts is and to discover that we need to know what each is for. Our central task is to determine what it is, and everything else is secondary and so is shelved under the category “necessary.” The problem with this explanation is that some necessary features result from what a thing is. If we want to know what birds are, we need to understand that “of necessity” they are two-footed, even though this is not for anything.

Given the problems with those explanations, the most likely account is the following: Aristotle’s goal is to bring out the importance of teleological explanations. He wants to show that, in addition to those other explanations people give, in terms of necessity, you must also give teleological explanations (this is a theme throughout *PA* I.1). Aristotle accepts his predecessors’ reliance on necessity as a cause (as he understands his predecessors) and sees himself as adding to their type of account.

The *Parts of Animals* might also be, in one respect, closer to a more Platonic way of thinking about the natural world. It is striking that Aristotle’s two causes seem closely related to the explanatory structure of Plato’s *Timaeus*, where the Demiurge does everything for the sake of what is best (29e–30a) and necessity is introduced as an additional part of the explanatory framework and called the wandering cause (47e–48b). There are a number of very important differences between Aristotle’s explanatory project and Plato’s. But perhaps Aristotle’s two causes are more close to the *Timaeus* than Aristotle’s account in other works. I have argued elsewhere that Aristotle sees his four causes as anti-Platonic.²⁶ Perhaps *Parts of Animals* II–IV was composed before he took on this more anti-Platonic account of causation. It is easy to imagine that it was composed while in Assos or Lesbos – although that is pure speculation. The other possibility is that he

²⁴ Leunissen 2010 *passim*, first explained at p. 4 and pp. 18–19.

²⁵ To be clear, in such cases necessity is not listed as a cause; the point is just that being for the sake of something is not an alternative to being necessary.

²⁶ Ebrey 2014.

thinks, for some reason, that in the *Parts of Animals* we only need these two causes, despite the fact that in the *Phys.* II.7 he insists that the natural scientist identify all four causes for each thing investigated (198a21–24).

Conclusion

I have argued that the role of matter in the *Parts of Animals* is quite different from that of necessity. When Aristotle mentions matter in *Parts of Animals* II–IV, he reserves the term for what things properly come to be from. This is generally identified as blood, the thing that the body concocts as the refined nutriment, able to become any of the parts or to fuel their growth and nourishment. By contrast, Aristotle frequently identifies “of necessity” as a cause. In many cases this involves what we might identify as the matter and efficient cause working together, although Aristotle never identifies them this way in the *Parts of Animals*. Other examples of “of-necessity” causes involve facts about the essence of the creature or some sort of conceptual necessity. Aristotle is not interested in separating out the different types of necessity at work in these examples. Instead, he draws everything back to the necessary and that for the sake of which. Matter and necessity have very different roles in the *Parts of Animals*.