Aristotelian Change and the Scala Naturae

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For my Parents
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Introduction: The *Scala Naturae*

“Research into the soul contributes greatly to truth in general, and most especially to truth about nature.” (*De anima* I.1 402a4-6)
0.1: Why are there different kinds of soul?

Aristotle is often credited as being the first to categorize the natural world according to gradations of being, or what has been called the *scala naturae*.\(^1\) To some degree this truism is an exaggeration, because distinctions among living things are certainly made, explicitly or implicitly, in many early philosophical works, most notably in the works of Plato. But Aristotle’s classification did do something new: it distinguished general types of living things by means of different kinds of soul. His division of the types of living beings, or more properly the types or parts of soul, is relatively clear and seems intuitive upon first glance. Broadly speaking, he divides up the natural world into non-living things and living things, and then subdivides the category of living things into plants, sentient animals, and human beings. Each part of soul is identifiable according to recognizable faculties: plants can take in nutrition, grow, and reproduce; animals have the faculties of plants, but also have sensation and possibly imagination, memory, and the power of locomotion; humans have the faculties of both plants and animals plus the use of reason. No one disputes that Aristotle divides up the natural world in this way. But when we think about this division of nature, and especially when we consider the categorization of powers among the different kinds of soul, some questions arise: why are there only three kinds of soul, but more than three kinds of faculties? Why is motion a peculiar faculty of animals and not of plants? Why is imagination a sentient faculty as opposed to a rational faculty? Too often scholars take the facts of Aristotle’s division of the *scala naturae* as a given in his system, a product of empirical observation and not theory. And yet, this assumption on our part seems contrary to Aristotle’s own approach to science. For he himself says that a proper understanding of a subject matter requires not only that we know the facts of the matter, but the reason why.\(^2\) Therefore, the question that I will tackle in this dissertation is this: Why does Aristotle divide up the soul into these three kinds?

A purely historical approach to answering this question indicates that Aristotle is, to some degree, adopting and modifying views about kinds of soul from his predecessors, most prominently from Plato.\(^3\) This is unsatisfactory for many reasons, not the least being that the similarities are largely superficial. It is true that Aristotle divides up the human soul into three parts like Plato does, but the content of those parts differ substantially enough that an historical account of Aristotle’s tripartite soul does not explain why he divides up the parts of soul in the way that he does. Further, Aristotle’s association of the parts of soul with different *kinds* of life is not found in Plato, who in several accounts indicates that human souls can inhabit different kinds of bodies via the transmigration of souls. So even if we can say that the tripartite division of soul is influenced by Plato, the division into mutually exclusive *kinds* of living beings is left unexplained.

Klaus Corcilius and Pavel Gregoric point out that the standard account of Aristotle’s division of the soul into parts is often thought of solely in terms of its faculties. For example Richard Sorabji writes, “Aristotle’s statement, that the most appropriate account of the soul is the one which picks out these capacities, already suggests the thought that perhaps the soul just *is*...

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2. Cf. *DA* II. 413a13-10; *Met.* I.1 981a24-28; *Apo.* I.2 71b9-10.
3. For example of a scholar who takes this explanatory approach, Cf. Kenny 2010: “Aristotle took over and developed some of Plato’s ideas, such as the division of the soul into parts and faculties and the philosophical analysis of sensation as encounter, but his fundamental approach differs by being rooted in the study of biology.” (Kenny 2010, 191-192)
these capacities. This thought it confirmed when we notice that Aristotle speaks of the capacities as *parts* of the soul."^4 But there are problems with this widely held view, principally that it does not indicate why there are only three kinds of soul, rather than a kind of soul for each combination of faculties.^5 As Thomas K. Johansen puts it, “we need to clarify the criterion of parthood which says ‘a part is a capacity of soul whereby one of the different kinds of soul is defined in the manner of its differentia’.”^6 So, what is the principle that divides the faculties up into different parts or kinds of soul?

0.2: Ways of justifying Aristotle’s *scala naturae*

On this division of the parts and kinds of soul, all agree on the fundamental division between plants, animals, and humans. And among those who have considered what distinguishes each part/type of soul, there is an agreement that nutrition is determinative of the nutritive soul, sensation of the sensitive, and *noein* of the intellective soul. But each gives different and unsatisfactory answers for the reason why these faculties determine a different kind of soul. Corcilius and Gregoric propose the idea of separability as what makes a faculty determine a new kind of soul.^7 The principle is as follows: if a faculty of soul is definitive of a type or part of soul, then it is separable. They then explain that for Aristotle, the prime notion of separability is the following:

**Separable 1:** To say that *x* is separable from *y* means that *x* can exist independently of *y.^8**

By “independent existence,” they take Aristotle to mean independent of other faculties. Such independence allows a particular faculty to be identified with the soul without reference to the other parts of soul. They then show that both the intellective capacity and the nutritive capacity are definitive of the souls of independently existing beings.^9 However, they run into a problem with sensation, for sensation is determinative of a part of soul but cannot *exist* independently without at least one other part, namely the nutritive soul. To overcome this problem, they show that Aristotle identifies another kind of separability as central for distinguishing parts of soul, namely separability in account. They define this kind of separability in the following way:

**Separable 2:** To say that *x* is separable from *y* in account means that the account of *x* is independent from the account of *y.^10**

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4 Sorabji 1974, 64. Corcilius and Gregoric give other examples, for instance Barnes 1971, 105 and Polansky 2007, 8. Also, “Any erosion of the firm distinctions between non-living and living, and between plants and animals (distinctions that correspond to the clearly demarcated differences in the faculties of soul that they possess), would be a major source of embarrassment for Aristotle’s theory.” (Lloyd 1992, 167)

5 There are a number of variations of this criticism of the standard view. See the following discussions: Klaus Corcilius and Gregoric 2010, 83-84; Shields 2016, xxviii-xxix.

6 Johansen 2013, 61.

7 They point out that Jennifer Whiting affirms this implicitly in Whiting 2002.

8 Corcilius and Gregoric 2010, 90.


10 Cf. Corcilius and Gregoric 2010, 96.
This is a helpful definition, and they make a good argument that Aristotle intends to distinguish the parts of soul by means of this kind of separability. However, it raises the specter of a new problem: they cannot offer a clear account of intellect that distinguishes it from sensation. They write, “The thinking capacity is more difficult [than the nutritive and sensitive capacities], as Aristotle’s account of this capacity is more sketchy, but it will not be off the mark to say that it is what receives intelligible forms or what grasps essential features.”

They are correct, of course, to say that Aristotle’s account of intellect is difficult to pin down, but without an account we can only know that he thinks the mind is separable in account, not why. If they are separable, then the why is all important.

Johansen, who has also considered the parts of soul in detail, takes a different route from that of Corcilius and Gregoric. He notes that “On their reading . . . the parts of soul are confirmed as basic explanatory principles by their role in explaining the various kinds of living being but their status as parts is established prior to this confirmation by their being capacities which are definitionally primitive and separable. On my reading, in contrast, the notion of parts of soul is always indexed to the soul of certain kinds of living being.” In other words, Johansen does not think that one has to confirm the particular capacities of soul as definitive of a kind or part of soul by discovering their separability in account. Rather, he takes these powers as definitive of kinds of soul as basic. For instance, when he discusses why sensation defines a part of soul but not phantasia, he says, “the reason why it does not count as a part of soul, but perception does, is that perception is explanatorily basic in relation to phantasia in the lives of animals. It is perception that differentiates animals as what they are, not phantasia.”

On the face of it, Johansen’s approach is attractive, because it means that we do not have to worry about the fact that Aristotle does not clearly define intellect in the way he defines nutrition and sensation. However, by making nutrition, sensation, and intellection basic in the definition of soul, Johansen has a different problem: why do we give the same name, “soul” to these different parts? The explanatory basicness of the faculties defining each part of soul does not explain why we talk about each as parts of soul rather than different souls. Aristotle himself notes the problem in DA II.3. There Aristotle indicates that each type of soul is unique, but that there is an overall relation between every soul in the same way that triangles, squares, etc. are all called “figures.” Johansen interprets this passage to mean that there is no genus of soul. That is a common interpretation of the passage. It is, moreover, an interpretation Johansen has to accept if the capacities are indexed to different kinds of living beings, since explanatorily basic character of faculties like nutrition, sensation, and intellection do not admit of a genus.

I think that Johansen’s view is the wrong interpretation and that, in fact, Aristotle does provide a generic definition of soul. Indeed, he famously provides several. So I agree with Christopher Shields that it would be rather jarring for Aristotle to present several generic definitions of soul and then a few lines later deny that such is possible, with no transitioning argument. I will not argue here in support of this reading of the text. Instead, I will let the argument of this dissertation make it for me. So, if Aristotle really does propose a generic

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12 Johansen 2013, 58, fn.31.
13 Johansen 2013, 62.
14 Cf. DA II.3 414b20-28.
15 Johansen 2013, 63.
17 Cf. DA II.1 412a27-412b1.
definition of soul, then there must be a reason why the three faculties of nutrition, sensation, and intellection determine distinct parts or kinds of soul. What is that difference?

0.3: My hypothesis for how to distinguish the kinds of soul

To get at that difference, let us take a glance at the passage from *DA* II.3 to which I just referred. There Aristotle writes:

(I) What holds in the case of the soul is very close to what holds concerning figures: for in the case of both figures and ensouled things, what is prior is always present potentially in what follows in a series—for example, the triangle in the square, and the nutritive faculty in the perceptual faculty.\(^{19}\)

I think that the comparison with the series of figures helps. There is a generic similarity between figures, namely that they are lines arranged such that they compose an enclosed plane. Once we have a triangle, to generate the next figure we simply need to add an additional line. This addition changes the kind of shape, for it changes the ways that each side and angle relates to the others.

With the soul, faculties that determine a distinct step in the *scala naturae* must add some dimensionality to the soul, so to speak, and we must determine what dimensionality is being added that is different from the faculties of the previous steps. What I propose is that the new faculties add a new way in which the ensouled body can engage in change. After all, faculties are potencies for change. What I think characterizes the three kinds of faculties, and therefore the three kinds of soul, is that they introduce a new kind of change. This would make sense because, as Aristotle insists, the study of soul belongs to the study of nature, and the study of nature is the study of things that change according to certain regular principles.\(^{20}\)

0.4: The general outline of the dissertation

How will I proceed to explore how to understand these different kinds of change? First, I will begin with an examination of natural change in general. This examination of change in general will then help us to determine the most primary kind of natural change, that of all bodies. In chapter one, we will look at what Aristotle thinks the principles of change are, and how he arrives at that conclusion by examining a controversial argument in *Phys.* II.5. It will turn out that the principles of change are contraries and their intermediates. Then in chapter two, we will examine the basic principles of non-living corporeal change, and investigate how the qualities of hot, cold, wet, and dry are related as contraries and are fundamental to the most basic kinds of change. Once we understand change that is common to all bodies, we will be ready to examine what determines change in a living body, namely what makes plants different from non-living bodies. This will be done in chapter three. There we will examine how mixtures interact and change and why the powers of the vegetative soul cannot be reduced to complex combinations of the basic potencies in the primary qualities of body. After that we will examine the unique features of change of sensation in chapter four. This type of change is proper to animals, and

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\(^{19}\) *DA* II.3 414b28-32.

differs from the vegetative powers in that it receives the forms of objects without the matter. I will examine what this means and where my interpretation is situated in the famous debate over literal vs. spiritual change in sensation. Lastly, I will complete the examination of the powers of soul in chapter five with an inquiry into the difference between the changes brought about by the intellect and sensation. In doing this we will see that whereas the powers of sensation receive particular forms without matter, the intellect receives the forms universally without matter. At each stage of this examination I will attempt both to reveal the specific differences that allow us to see what makes nutrition, sensation, and intellect different in kind from one another, and how my reading can resolve common problems discussed in the literature associated with each topic. What we shall see is that understanding these differences with reference to kinds of contrariety involved in change will help us to see why the *scala naturae* is structured in the way that it is.

0.5: Some notes on the use of texts and translations

Before we enter into our examination, I want to make a brief note about the translations of Aristotle that I will be using. Methodologically, I prefer to use translations that are commonly available over providing my own in the hope that it will be easier for the readers not familiar with Greek to find the passage in question. I have most often adopted the translations available in the Clarendon series, but on occasion I have preferred translation from the revised Oxford translations and the Loeb editions. When discussing a particular book, I have tried to stay with a single translation in all of my references in this dissertation. However, when I have modified translations, have changed the translation I am using, or have offered my own, I will highlight this change in the footnotes.

I hope that the arguments presented in this text will prove engaging for both experts and non-experts alike. I even dare to hope that some of my readers may decide to change their minds as a result of my arguments. But most of all, I hope that the arguments that follow will at least prove to be another angle on difficult texts that may help the reader to think again about the soul and the difference it makes.
Chapter 1: Contraries and Change

“When the objects of an inquiry, in any department, have principles, causes, or elements, it is through acquaintance with these that knowledge and understanding is attained. For we do not think that we know a thing until we are acquainted with its primary causes or first principles, and have carried our analysis as far as its elements. Plainly, therefore, in the science of nature too our first task will be to try to determine what relates to its principles.” (Physics I.1 184-10-16)
1.1: Introduction

As Aristotle says in his introduction to the *Physics*, it is only when we understand the principles of a subject that we can have true knowledge in that subject. If we are going to distinguish the different kinds of nature, then the place to search for these differences is among the principles of nature. Fortunately, Aristotle identifies for us what these principles of nature are in an argument presented in *Physics* I.5-7: the primary contraries of form and privation, and a subject of change. Aristotle begins that extended discussion with an argument for contraries as principles of nature, and it is that initial part of his argument that I want to focus on in this chapter. Why? Because it is in this argument that Aristotle outlines the necessary conditions for any change. I think that if we can understand why principles of nature must be contraries and how contraries explain natural changes, then we will understand how to identify essential difference between kinds of nature in Aristotle’s *scala naturae*.

To see why Aristotle identifies contraries as the fundamental principles of nature, we must look closely at an argument Aristotle offers for this view in *Phys*. I.5. It is helpful to examine this argument for two reasons. First, the *Phys*. I.5 argument contains the building blocks for Aristotle’s explanation of nature and natural change, and only by understanding these building blocks of nature and natural change can we begin to distinguish the different kinds of beings that change. After all, if there are different kinds of change that are rooted in different kinds of natural principles and if different kinds of natural principles differentiate different kinds of natural beings, then we can use those different kinds of change to identify different kinds of natural beings. Second, despite its abundance, the literature on this passage shows that there is no consensus on how to accurately reconstruct it. Taking time to identify the problems with previous reconstructions of the argument in *Phys*. I.5 and solving those problems will put us in a better position to understand how Aristotle models the most basic kind of natural change in *De generatione et corruptione*, which we will discuss in the next chapter. The hope is that by understanding the mechanics of change in general we will be able to see differences in kinds of change, including the differences in the kinds of change associated with different kinds of soul, as we ascend the *scala naturae*.

In this chapter I will reconstruct and analyze the argument in *Phys*. I.5 for contraries as principles of nature. As I noted above, we will see is that there is a significant amount of disagreement in the literature about how the argument is supposed to work. I will propose a reconstruction that I think resolves the thorniest questions. In the process of examining this argument, we will see that Aristotle thinks that some of the *per se* (i.e. essential) principles of nature are contraries. We will also see that contraries are necessary for natural change, and the reason why is that they give a principled account for how and why material interactions take place. That means that a natural being has encoded in its very essence the possibilities of change that can occur, whether that being is alive or not. Lastly, we will see how intermediates between the most extreme contraries are related to their extremes, and how the ability for intermediate properties to change is rooted in their relationship to the extreme contraries.

1.2: The argument for contraries as principles of nature

Aristotle’s argument for contraries as the principles of nature is roughly the following. He begins his argument in *Physics* I.5 by distinguishing between chance occurrences and “natural” (*pephuken*) change: “It is necessary to first accept that among all existing things, no thing
naturally (*pephuken*) acts on a thing by chance or is acted upon by some chance thing.”

Aristotle will build on this point, and in later chapters he will say that changes that result from chance events or are artificial changes are posterior to, and ultimately rooted in, some natural principle. Even changes that are “contrary” to nature are ultimately rooted in some natural principle. Aristotle draws a surprising conclusion from the idea that no natural change occurs by chance or accident, namely that “If then this is true, everything that comes to be or passes away comes from, or passes into, its contrary or an intermediate state.” This last statement is sudden and it is not immediately apparent why it follows from the previous remarks. I will discuss this issue in detail below. Finally, Aristotle says that all intermediates are from contraries. By this he means to reduce the causal efficacy of intermediates to the contrary extremes, with the result that he affirms that these contraries are the principles from which change comes.

I reconstruct his account formally in the following way:

1. No being naturally acts or is acted upon by happenstance.
2. No being naturally is generated into just anything whatsoever.
3. No being naturally corrupts into just anything whatsoever.
4. Therefore, every instance of natural change is either from contraries or intermediates of contraries into contraries or intermediates of contraries.
5. All intermediates are from contraries.
6. Therefore, every instance of generation and corruption are from contraries or into contraries.

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22. Regarding chance induced changes, Aristotle says: “Both are then, as I have said, accidental causes—both chance and spontaneity—in the sphere of things which are capable of coming to pass not simply, nor for the most part with reference to such of these as might come to pass for the sake of something.” (*Phys.* II.5 197a32-35) He continues in a later passage: “Now since nothing which is accidental is prior to what is *per se*, it is clear that no accidental cause can be prior to a cause *per se*. Spontaneity and chance, therefore, are posterior to intelligence and nature.” (*Phys.* II.6 198a5-10) NB: All quotations from the *Physics* are Hardie and Gaye’s translation found in Jonathan Barnes’s revised Oxford version unless otherwise noted.

23. In fact, according to Aristotle there are no changes contrary to nature except in the case of motion (cf. *Phys.* V.6 230a7-29). Even contrary motions are rooted in nature: “all movement is either compulsory or according to nature, and if there is compulsory movement there must also be natural (for compulsory movement is contrary to nature, and movement contrary to nature is posterior to that according to nature, so that if each of the natural bodies has not a natural movement, none of the other movements can exist).” (*Phys.* IV.8 215a1-6) Even the case of monstrous births is rooted in natural change, for they are chance events, and as noted above, all chance events are rooted in nature. Sophia Connell remarks, “So although they can be predicted, monsters are the result of pure chance. There is a natural grounding for them but we cannot have any proper knowledge of monstrosity itself other than that it involves the absence of teleology (*GA* 4.10, 778a5-9).” (Connell 2018, 223) Also cf. Upton 2003 for how it can be the case that humans only beget humans and that humans can bear so-called monsters (*τέρατα*).


27. *Phys.* I.5 188b3-5.

28. “If then this is true, everything that comes to be or passes away comes from, or passes into, its contrary or an intermediate state.” (*Phys.* I.5 188b21-23)

29. “But the intermediates are derived from the contraries—colors, for instance, from black and white.” (*Phys.* I.5 188b23-25)

30. “Everything, therefore, that comes to be by a natural process is either a contrary or a product of contraries.” (*Phys.* I.5 188b25-26)
It is plausible on a first pass to take this account as a deductive argument. But if it is deductive, it is unclear how propositions (1)—(3) yield proposition (4). After all, proposition (4) concludes that every change is between contraries and their intermediates, but propositions (1)—(3) do not mention contrariety at all.31 These propositions only say that change in general does not happen at random. What is the connection between not happening at random and contrariety? This question is, I think, the key problem for understanding the argument, because if we can find an answer to this question, then we can provide an answer for why Aristotle thinks that he has proven that contraries are the principles of change. So, how do propositions (1)—(3) entail proposition (4)? To answer that question we first must understand what kind of argument Aristotle is making here.

Robert Bolton and Sylvain Delcomminette have argued convincingly against Terrence Irwin’s reconstruction of the Phys. I.5 argument as a demonstration of the kind found in Posterior Analytics.32 Instead, they suggest reconstructing the argument as a kind of induction, and they have support for this reconstruction from ancient commentators like Simplicius and Themistius.33 Delcomminette suggests that the induction is based on Aristotle’s rhetorical question: “For how can white come from musical, unless musical happened to be an attribute of the not-white or black?”34 Aristotle then asserts that, indeed, the white must come from the not-white or black. Delcomminette writes, “In the present case, induction consists in passing from instances of change between specific contraries to the relation of contrariety itself as a general structure displayed in any change.”35

However, while Bolton and Delcomminette make a strong case for interpreting the argument of Phys. I.5 as an inductive argument, there is a significant gap in the inductive process, namely that there are no particulars related to premise (4), the key premise whose entailment is in question. Such particulars are essential to an inductive argument, as Aristotle himself says both in the Topics and the Posterior Analytics.36 One might object that Aristotle does indeed give particulars for induction. For instance, Delcomminette says that one example is given and that this one example is sufficient for the induction. He marshals APo. I.31 88a11-17 and II.2, 90a24-30 in support of his argument.37 However, we must pay attention to what kind of examples the Posterior Analytics passages require for induction, not the number. The examples for induction in the Posterior Analytics passages are concrete experiences, whereas the examples of contraries in Phys. I.5 are not. But even if the example of the contraries were able to satisfy the Posterior Analytics requirements, it seems to me that the examples are used to support premises (1)—(3), not premise (4), which is supposed to be the premise which comes from the induction. What we see is that Aristotle presents the conclusion in premise (4) as being derived

31 The examples that Aristotle gives in support of premises (2) and (3) do include contraries. But the claims he articulates do not, and I take it that premise (4) is supposed to be entailed from the actual claims themselves and not the examples.
33 “Consequently, so sum up the inductive reasoning (τῆς ἔπαγωγῆς), it is true to say that everything which comes into being and which is destroyed does so either from contraries or into contraries or those in-between.” (Simplicius, In Phys. I,186.9) Cf. Themistius Commentary on Physics 20.17-18.
34 Phys. I.5 188a35-36.
35 Delcomminette 2019, 171.
36 Cf. Top. I.12 105a13-14; APo. II.19 100b3-4.
37 Cf. Delcomminette 2019, 171. Thanks to Dan Devereux for pressing me on this point and helping me to clarify the argument.
directly from premises (1)—(3), not from any example. What support can I offer for the claim that premise (4) is derived from (1)—(3) and not from the examples for induction? Consider this. If premise (4) was a product of induction, we would expect the argument to be derived directly from the examples, as Aristotle’s example of induction in *Topics* I.12 does. His example of an induction is the following: “If the skilled pilot is the best pilot and the skilled charioteer the best charioteer, then, in general, the skilled man is the best man in any particular sphere.”38 Now, as I said, it does appear to be the case that premises (1)—(3) are products of induction. Aristotle begins by articulating each premise and then follows that articulation with an explanatory “gar” followed by some examples. Therefore, it is reasonable to assume that premises (1)—(3) are inductions from the examples because the argument structure is relevantly similar to what Aristotle says in *Topics* I.12. But the conclusion of premise (4) is not followed by any particular examples, which we would expect if it were a product of induction. Therefore, I think that while premises (1)—(3) may be derived by induction, premise (4) is not.

Another problem with the idea that premise (4) is the result of an induction is that it does not help to explain the mysterious character of premise (4). In all the examples of induction, the general principles that are concluded are found, in particular form, in the examples from which they are induced. But premise (4) is a general conclusion about contraries and there is no explicit mention of contrariety in (1)—(3), and so even if we could say that premise (4) is an induction from premises (1)—(3) there is still an apparent unexplained appearance of contraries in the conclusion that were not apparent in the premises. Therefore, reconstructing this argument as an induction does not help us to understand how premises (1)—(3) yield (4).

Lindsay Judson has recently proposed another approach to understanding the *Phys.* I.5 argument. He proposes that premise (4) is not inferred from premises (1)—(3), but the exact opposite is true: that premise (4) is the justification grounding premises (1)—(3).39 He does this to make sense of the apparent gap between (1)—(3) and (4) that we have noted.40 At first glance this approach makes a lot of sense. However, Judson’s solution creates an even bigger problem. By his own admission, his interpretation cannot explain why Aristotle ultimately concludes in *Phys.* I.7 that form and privation are the primary contrarieties. Judson’s inability to explain Aristotle’s conclusion in *Phys.* I.7 stems from his requirement that the contraries of *Phys.* I.5 must both be “causally efficacious ingredients, rather than a blend of form and its absence.”41 He notes that this is not true of the conclusion Aristotle reaches in *Phys.* I.7, which “seems willing to treat privation as simply the absence of form.”42 So, while Judson may have fixed the problem of a gap between (1)—(3) and (4) by switching around the premises, he creates a much more significant gap between *Phys.* I.5 and I.7. This is not a satisfactory solution, especially if one agrees with Kelsey and others, as I do, that *Phys.* I.5-7 is one continuous argument. Even without

38 *Topics* I.12, 105a14-16. Forster translation.
39 Cf. Judson 2018, 141-149. I should note that Judson is also reticent to translate ἐναντία in this passage as “contraries.” He rightfully notes that the notion is slippery, and does not mean the same thing here that it does in *Categories* 10. However, as we will see, I think he goes too far when he also denies that ἐναντία in this passage is not the same usage as that in *Met.* X. That being said, he translates ἐναντία here, with a strong reservation, as “opposites.”
40 In a footnote, Judson remarks that Kelsey’s solution to the problem is to keep (4) as an inference but to restrict the argument to a narrow domain of change, and he rightly points out this is not a solution. Cf. Judson 2018, 144, fn.47.
41 Judson 2018, 147.
42 Judson 2018, 147.
that supposition, though, an interpretation that closes a smaller gap to create a larger one ought to be avoided if the text allows.

There is no easy answer to the question of how premise (4) is supposed to follow from premises (1)—(3), but it seems to me that the most natural way of reading the argument is in terms of a different method than the ones considered: an argument from elimination, also called the method of division. What I mean is that Aristotle has some preconceived division of being already in mind that he is presuming in this argument. If that is so, and if we take premises (1)—(3) to be eliminating items within that set, then the conclusion in line (4) would be all and only the remaining items in the presumed set. This type of argument differs from the kind of deductive argument that Delcomminette and Bolton reject, because the Irwin-style deduction reconstructs the argument as a (bad) demonstrative syllogism. I should also note that while most contemporary logic systems would count the method of division as deductive, Aristotle explicitly distinguishes this type of reasoning from deductive syllogistic reasoning.\(^4\) I am proposing, then, that understanding Phys. I.5 as an argument that uses the method of division will allow for a reconstruction that escapes the criticisms of Delcomminette and Bolton, avoids the pitfalls of Judson’s reconstruction, and allows us to see more clearly the logical structure of Aristotle’s argument.

Such a reading of the text can explain the oddities of the argument. For one, it explains why Aristotle can be confident in his conclusion in premise (4), when contraries and intermediates have not appeared in any of the articulations of premises (1)—(3). If (1)—(3) have, in fact, eliminated members of a set as possibilities for defining natural change, then it becomes clearer why contraries are not mentioned in them, for we would expect (4) to list the remaining items within the set that are not in the excluded items mentioned in premises (1)—(3). Hence it would be fine for contraries to appear in the conclusion even if they don’t figure in premises (1)—(3), provided we can give a principled account for what that original set of items is and that contraries show up among the members of the original set alongside the items that Aristotle dispenses with in premises (1)—(3). My reading also explains why the inference looks like an induction, for inductions make inferences without a middle term. Likewise, an elimination of particular premises allows for an inference without a middle term. What is more, in APo. II.13-14, Aristotle presents the method of division as a way to formulate a definition and for the establishment of the proper set of problems related to a given science. James Lennox and others have argued convincingly that the method of division is an essential first step in the scientific process described in the Analytics.\(^4\) Therefore, it would make sense that Aristotle begins his investigation into the principles of nature with an argument from division. While some scholars may find Aristotle’s adoption and explanation of the method of division in APo. II.13-14 baffling, such bafflement is no reason for us to think that he would never use such a method in his scientific investigations.\(^5\) If he believes it to be appropriate for arriving at a definition, then we should expect him to use it for arriving at a definition. Defining nature and the set of problems belonging to nature is clearly what Aristotle has in mind in this final part of Phys. I.

\(^{43}\) Cf. APo. II.5 91b12-15.


\(^{45}\) Wiener 2015 criticizes the conclusions of the consensus established by the previous authors, but even his criticisms depend on the idea that the method of division is essential for establishing the proper parameters of a problem and using it for scientific purposes.

\(^{45}\) For an example of bafflement over this methodology, see Barnes 1994, 240-249. I think that Barnes’s criticisms are at best overstated and at worst just wrong. But that discussion is for another time.
Therefore, I think we should understand the argument in \textit{Phys. I.5} as an argument from elimination.

However, this line of reasoning requires that I answer a question: what is this set of items that Aristotle considers in order to draw his conclusion about contraries as the principles of all natural change in the \textit{Phys. I.5} argument? I think that by examining the text carefully we can discover the members of that set and make sense of the inference from (1)—(3) to (4).

1.3: That the principles of nature are \textit{per se}.

Happily, it is a straightforward task to identify a simple set of items that Aristotle must have in mind. To identify that set, we must first remember the subject of the search. The project is to explain \textit{nature}, and premises (1)—(3) each mention and rule out some possible source of \textit{natural} change. As Aristotle says later on, nature is a principle of motion or change.\footnote{\textit{Phys. III.1} 200b12-13.} This aspect of the argument is evident from Aristotle's consideration in the argument of acting (\textit{poiein}), receiving (\textit{paschein}), generating, and corruption. Therefore, the investigation into nature is an investigation into the origin of motion or change. This framework gives us a genus within which to work.

How is the genus of motion or change divided? Delcomminette points out that “natural” (\textit{pephuken}) here is opposed to “accidental” (\textit{sumbebēkos}), as is clear from an examination of the text that gives us premises (1)—(3).\footnote{Delcomminette remarks, “I think that this is the force of \textit{pephuken} at a32–3 (and thus of \textit{phōsi} at b25), which should be contrasted with the phrase \textit{kathā συμβεβηκός} (a34, b4–5), referring to the same process under a misleading description.” (Delcomminette 2019, 169)} Note the language Aristotle uses to establish the first premise: “It is necessary to first accept that nothing among all existing things, naturally (\textit{pephuken}) does just anything from just anything (to \textit{tuchon hupo tou tuchontos}) nor is just anything acted upon by just anything.”\footnote{\textit{Phys. I.5} 188a32-33. The translation is mine. This phrase is difficult to translate, but I think Delcomminette is correct in his assessment of the structure. He writes: “Charlton 1992, 11 translates ‘nothing whatever is by nature such as to do or undergo any chance thing through the agency of any chance thing’. The problem of such a translation is that it introduces a third term in what are clearly dual relations, as the rest of the text confirms. I therefore construe \textit{tuchon} only with \textit{pouein} and \textit{hupo tou tuchonos} only with \textit{paschein}. Alternatively, one could construe both with both \textit{paschein} and \textit{tuchon hupo tou tuchontos} only with \textit{paschein}. Therefore, this line of reasoning requires that I answer a question: what is this set of items that Aristotle considers in order to draw his conclusion about contraries as the principles of all natural change in the \textit{Phys. I.5} argument? I think that by examining the text carefully we can discover the members of that set and make sense of the inference from (1)—(3) to (4).”} This statement denies a lack of restrictions on what sorts of relata can be associated with a given action. But also note: it is not the actions that are restricted, but specifically the relata in the action. Aristotle is explicit that no \textit{chance thing} can act or be acted upon by \textit{any chance thing}. So, the restriction is upon the relata of the activity, and Aristotle is insisting that this restriction specifies which types of relata can and cannot be involved in the actions and motions relating them. This restriction indicates that the principles of change are properties of the objects that change, and that there is an inherent connection between the objects of change that makes the interaction possible. Aristotle writes something similar regarding premises (2) and (3): “Nor does anything come to be from anything whatsoever, unless one assumes that it results accidentally (\textit{sumbebēkos}).”\footnote{\textit{Phys. I.5} 188a33-34) The translation is mine. Delcomminette offers a similar translation.} Again, Aristotle is denying that there are no restrictions on what relata can be on either side of the relation of generation or corruption. But in this sentence he also gives a reason why there has to be such a restriction: “unless one
assumes that it results accidentally.” The reasoning here seems to be that if the relata of change are unrestricted, then the change would be accidental rather than natural. But, as we will see, Aristotle’s premise (4) makes it clear that the claims in premises (2) and (3) are even stronger. For by denying an accidental relation Aristotle thinks that only naturally related relata remain. What this means is that Aristotle holds that motions and changes are divided into accidentally related motions and change and naturally related motions and changes.

This interpretation is confirmed by the examples which ground premises (2) and (3). Aristotle writes, “For how could white come from musical, unless musical happened to be accidentally (sumbebēkos) related to the not-white or the black?” What the rhetorical question in this passage indicates is that mere accidentally related relata are not the true principles of change, and are only said to be relata insofar as there is a more fundamental set of relata that are not accidentally related that ground the change. So, accidental things can be related in a change, but only insofar as there is a natural relation that grounds them. Therefore premises (1)—(3) jointly entail that natural change does not include accidental change.

This opposition between natural change and accidental change is a stable view of Aristotle’s. We see that he maintains this opposition most clearly in other passages of the Physics. For example, in Phys. II.1 Aristotle says:

(I) Nature is a principle or cause of being moved and of being at rest in that to which it belongs primarily, in virtue of itself and not accidentally. I say ‘not accidentally’, because (for instance) a man who is a doctor might himself be a cause of health to himself. Nevertheless it is not in so far as he is a patient that he possesses the art of medicine; it merely has happened that the same man is doctor and patient—and that is why these attributes are not always found together.51

In text (I) Aristotle is pointing out that accidental change is grounded in natural change. It is not just any man who is able to cause health, but one who is a doctor, and if a man heals himself he does so precisely because he is a doctor. The example in text (I) is odd, but illustrative because of its oddity. It is an odd example because healing is clearly an art (technē), and not something we would normally consider a natural activity. But what makes the relation between “doctor” and “healing” natural is that there is an essential relation. Aristotle can make this connection in Phys. II.1 precisely because he concluded in premises (1)—(3) of the Phys. I.5 argument that natural change is non-accidental change, and therefore change occurs according to essential principles. It is clear, therefore, that Aristotle understands premises (1)—(3) to exclude accidental change from natural change.

That chance things are called such because they are only accidentally related is something that Aristotle affirms later in Physics II. He writes:

(II) (a) Things of this kind, then, when they come to pass accidentally are said to be by chance. (b) For just as a thing is something either in virtue of itself or accidentally, so

50 “πῶς γὰρ ἂν γένοιτο λευκὸν ἐκ μουσικοῦ, πλὴν εἰ μὴ συμβεβηκὸς εἴη τῷ μὴ λευκῷ ἢ τῷ μέλανι τῷ μουσικόν; (Phys. I.5 188a34-36) I take the datives τῷ μὴ λευκῷ and τῷ μέλανι to be datives of relation.
51 Phys. II.1 192b20-27. He also says later in book II “Spontaneity and chance are causes of effects which, though they might result from intelligence or nature, have in fact been caused by something accidentally. Now since nothing which is accidental is prior to what is per se, it is clear that no accidental cause can be prior to a cause per se. Spontaneity and chance, therefore, are posterior to intelligence and nature.” (Phys. II.6 198a5-10)
may it be a cause. For instance, the housebuilding faculty is in virtue of itself a cause of a house, whereas white or musical is an accidental cause. (c) That which is per se a cause is determinate (hōrismenon), but the accidental cause in indeterminable (aoriston).

The key thing for us to note in (II)(a) is that accidental changes are what we normally mean when we say that something happens by chance. Aristotle presents this, not unreasonably, as the definition of chance events. But notice that in (II)(b) Aristotle presents us with an opposition between things that are “in virtue of themselves,” or per se, and things that are “accidentally.” This seems to be the key division that Aristotle has in mind in Phys. I.5, that the two options for natural change are that it is either (1) per se or (2) accidental. Even the examples of “white” and “musical” that he uses in (II)(b) are similar to those found in the Phys. I.5 passage. So, we can reasonably presume that the division he is using in text (II) is the same one he has in mind in the Phys. I.5 passage. Finally, (II)(c) confirms the idea that per se relata are restricted. When he says that “a per se cause is determinate,” the determination is a restriction or limit of some sort. Accidental causes are “indeterminate,” i.e. unrestricted in their relatability. Going back to Phys. I.5, premises (1)—(3) exclude accidental changes from natural changes, and therefore premise (4) is the conclusion that the relata of natural change must have some sort of non-accidental, i.e. per se, relation.

With this in mind, I propose to think of the inference from (1)—(3) to (4) in the following way. Aristotle begins with a division of the relata of change as either accidental or per se pairings. (1)—(3) excludes all accidental pairings. Therefore, all that are left are per se pairings. But the confusing thing is that Aristotle does not conclude in line (4) that “every instance of generation and corruption are between per se relata.” Instead he says “every instance of generation and corruption are from contraries or intermediates of contraries into contraries or intermediates.” If my reading of the argument in Phys. I.5 is correct, then Aristotle must think that all per se relata of change can only be pairs of contraries and their intermediates. Or to put it another way, only points along a given axis of contrariety can be the per se relata in change. Therefore, the next question we have to investigate is why Aristotle restricts the per se relata of change to contraries and their intermediates.

1.4: Natural change, opposition, and contrariety

To understand why the per se relations in natural change require that change be between contraries and their intermediates, I think that we should turn to Aristotle’s discussion of contraries in Met. X. After all, it is there he discusses contrariety in the most detail. An in depth investigation into contraries now will be fruitful later on because it will help us to understand the necessary conditions for any change and prepare us to distinguish between different kinds of change and different kinds of contrariety.

The first step that Aristotle takes in Met. X is to recognize that the relata of change are different from one another, which is not controversial. But there are many kinds of differences. What we need are a select group of differences that are per se related and not accidentally related. The type of difference we are looking for are what Aristotle calls “opposites” (antikeimena). Note what he says in Met. X.5: "For only opposites (antikeimena) cannot be at the

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52 Phys. II.5 196b24-28. NB: I make some very minor modifications to the translation. The “things of this kind” mentioned in (III)(a) are any events that occur “for the sake of something.”
same time, and this fact is relied upon also in the question whether this or that came (ēlthen). For, if both could be at the same time, the question would be ridiculous.”

The question Aristotle is dealing with in *Met. X.5* is not unrelated to our question in *Phys. I.5*. When Aristotle excludes accidental relations from natural change in *Phys. I.5* it is because accidentally related relata are not mutually exclusive. In other words, accidentally related things “can be at the same time,” and therefore are not opposites. For example, when Aristotle says in *Phys. I.5*, “For how could white come from musical, unless musical happened to be accidentally (sumbebēkos) related to the not-white or the black?” the implication is that white and musical are not mutually exclusive in the way that white and not-white or black are mutually exclusive. It is only when we realize that the musical thing is also not-white or black that we can affirm that a change has happened. For not-white and white are opposites, i.e. they cannot both be at the same time. It seems obvious, then, that the relata of change are opposites, since they cannot both be at the same time, at least with respect to the properties that are changing.

If we accept that natural change happens between opposites, then we can formulate a set of opposites that is probably the set presumed in the *Phys. I.5* argument. Aristotle presents us with the same list of oppositions in at least three different locations. First, there is *Cat. 10*:

> “Things are said to be opposed to one another in four ways: as relatives or as contraries or as privation and possession or as affirmation and negation.”

The context of this passage is ambiguous, because the lines that introduce it in the text that we have are considered spurious and Ackrill is inclined to think that this passage marks a selection of texts unrelated to the previous eight chapters. But regardless of the context, Aristotle’s use of the impersonal *legetai* suggests that these are commonly held to be the possible alternatives for opposition. On its own, this passage is not enough to establish the set of possible oppositions. A second place where Aristotle gives a similar list is earlier in *Met. X*, when he writes that “oppositions are said in four ways, and, of these, one of the two is said according to privation, they would be contrary—and they would not be opposed as contradiction nor as things which are said as relatives.”

The context of this passage is that Aristotle wants to explain the many ways that the one and the many are opposed. He provides us with this list of oppositions as a starting place for discerning in what ways the one and the many are possibly opposed. This context provides us with strong evidence that he considers these options to be a complete list of opposition. There is further confirmation of this in a third text. Aristotle begins an argument in another chapter of *Met. X* by stating, “If then contradiction, privation, contrariety, and relatives are opposed...” This text is the antecedent of a conditional, and Aristotle does not argue for this antecedent here, he simply accepts it as true. Together, these three passages indicate that there are four kinds of opposites: (i) contraries, (ii) privation/possession, (iii) relatives, and (iv) contradictories.

If we examine the members of this set we will see that they can be further sorted into accidental and *per se* categories, and that Aristotle refers to all the *per se* oppositions as “contraries.”

Let us begin with the obvious category: (i) contraries. Why are these included among the *per se* oppositions? As Laura Castelli notes, Aristotle is committed to the idea that every pair of

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53 *Met. X.5* 1055b37-1056a1. Unless otherwise noted, all the translations of *Met. X* are from Castelli 2018. The emphasis is mine.

54 *Phys. I.5* 188a34-36.


58 *Met. X.5* 1055a38-b1.

contraries has some sort of generic similarity.\(^{60}\) This means that given any pair of contraries, there is some genus of which they are species. Because they share some generic similarity, contraries differ according to some specific difference. These differences are essential to the species, so if two opposed species of a genus differ in such a way that their defining properties are mutually exclusive, then these oppositions are by definition \textit{per se} properties. Contraries are so opposed. Therefore, contraries are \textit{per se} properties of a thing that divide a genus.

Next, we see that Aristotle reduces the relevant notion of (ii) privation/possession to contrariety. This should be no surprise, since in \textit{Phys.} I.7 Aristotle concludes that the primary contrariety in change is between possession and privation. Therefore, within the same context of reasoning in the \textit{Physics}, we see that Aristotle includes the privation/possession opposition as one of the kinds of contraries, and ultimately concludes in \textit{Phys.} I.7 that these are the primary contraries. So, if contraries are \textit{per se} oppositions, and the privation/possession opposition is a kind of contrary, then the privation/possession opposition is a \textit{per se} opposition.

However, there is a worry here. This link between contraries and privation/possession motivates Judson’s interpretation, largely because in the \textit{Categories} Aristotle indicates that there are privations that are not contraries.\(^{61}\) The example in the passage from \textit{Cat.} 10 that indicates this difference is the opposition between blindness and sight. One could not have sight and yet not be blind, e.g. a rock does not have sight but is not blind.\(^{62}\) That would be a problem for the view that privations are contraries, since it is necessary that the denial of one contrary entails the affirmation of the other. I think, however, that Judson’s worry is misplaced and the evidence he uses is problematic. Since Aristotle ultimately concludes that the primary contrariety of change is a privation/possession opposition, it is worth our time to resolve this worry before we proceed.

Let us take a look at the \textit{Categories} passage on this matter. In \textit{Cat.} 10.13a3-17, Aristotle uses the above example to distinguish privation from contrariety. He concludes the argument of this section with “Hence it is clear that things opposed as privation and possession are not opposed in either of the ways contraries are.” Although he seems to be distinguishing privation/possession from contraries, we ought not to take the meaning of “privation” in this passage as being the meaning of “privation” in the \textit{Phys.} I.5-7 argument that the primary contrarieties are between form and privation. For one thing, in \textit{Phys.} I.5-7 white and black are used as examples of both contrary oppositions and privation/possession oppositions. In the \textit{Cat.} 10, they are used as examples of contraries, not privation/possession oppositions. So, either Aristotle has changed his mind and in the \textit{Physics} he considers white and black to be a privation/possession opposition and that the privation/possession opposition is a kind of contrary; or maybe there this a more general and more specific use of the term “contrary.” If the latter is the case, then the following model would be true: there is a contrary\(_1\), which is more general, and contrary\(_1\) is subdivided into oppositions called contraries\(_2\) and privation/possession.\(^{63}\) Under this model, in \textit{Cat.} 10 Aristotle would be discussing contrary\(_2\), and in \textit{Phys.} I.5-7 he would be discussing contrary\(_1\). Either way, the \textit{Cat.} 10 distinction between contraries and privation/possession opposition is a poor motivation for Judson’s radical rereading of \textit{Phys.} I.5-7, since whether or not Aristotle has changed his mind, he clearly thinks in the \textit{Physics} that


\(^{61}\) Cf. \textit{Cat.} 10 12b26-13a17.

\(^{62}\) Aristotle says something similar in his first example of a privation in \textit{Met.} V.22 1022b22-24: “We speak of privation (1) if something has not one of the attributes which a thing might naturally have, even if this thing itself would not naturally have it, e.g. a plant is said to be deprived of eyes.”

\(^{63}\) Aristotle does, on occasion, mention things that do not have a proper name, and it might be the case that contraries\(_2\) is one of these types of objects.
privations are contraries. Therefore, I think we can safely say that Aristotle includes the privation/possession opposition among the kinds of per se contrarieties in the Phys. I.5 argument.

What about (iii) relatives? Castelli points out a helpful distinction in relatives. Aristotle indicates that there are per se relatives and non-per se relatives.64 This is illustrated in Met. X.6, when Aristotle says, “We have distinguished in other writings that relatives are said in two ways, some as contraries, some as knowledge is relative to what is knowable, because something else is said relative to it.”65 Here Aristotle splits relatives into two kinds of oppositions. The first kind are contrary relatives. Since these relatives are contraries, they would also count as per se oppositions. The second kind of relatives are more obscure. Aristotle says that these relatives are “as knowledge is relative to what is knowable.” While this kind of relative is obscure, it is clear that Aristotle thinks it is not a per se opposition. After all, Aristotle says just prior to this sentence that “the one is opposed to the many as measure to measurable; and these are opposed as those relatives which are not relative in their own right (mē kath’ hauta).”66 Knowledge, as it is related to the knowable, is like the measure as it is related to the measurable; both are related one to another, but not in a per se manner. This being so, then according to this division, while some relatives are not related in a per se way, insofar as relatives are per se related, then they are contraries.

What we have learned so far is that Aristotle explicitly calls any pair of opposites among (i)—(iii) contraries when they are per se related.67 There may be some relatives and privation/possession oppositions that are not per se, but when they are per se they are called contraries. So far, so good. However, we still have one more category to examine: (iv) contradictories. Castelli notes that the primary difference between contraries and contradictories is that whereas contraries are necessarily specific differences of a certain genus, contradictories are not.68 Why? Because contradictories do not need to fall under the same genus in order to be related as oppositions, whereas contraries do. For example, let us consider again the opposition between having sight and not having sight. This is not the same opposition as the contrariety of having sight and being blind. To be blind, the subject must belong to a generic class that would normally be expected to have sight, but in this individual case does not have sight. But the contradictory, having sight and not having sight, can oppose a human and a rock. The human has sight and the rock does not have sight. But this opposition does not say much about the pair, since I can replace “rock” with any number of things: the Eiffel Tower, a fig tree, an electron hovering next to my index finger. Because there is no common genus required, the specific differences that determine the contradictory relata need not be per se differences, but may be accidental differences.

64 “First, he says that the opposition of measure and measurable is an opposition of relative that are not relatives in their own right (b34), implicitly introducing a distinction between things that are relatives in their own right (or per se relatives) and things that are relatives not in their own right (non per se relatives). Furthermore (b35-36) he refers to a twofold partition of the relatives into 'contraries' (enantia) and relatives that are such by having something else said relative to them.” (Castelli 2018, 163)
65 Met. X.6 1056b35-36.
66 Met. X.6 1056b34.
67 Another passage that supports this conclusion is found in Met. X.7 1057a34-39: “Of the opposites, there is no intermediate in a contradiction (for a contradiction is this, namely an opposition such that one part or the other is present in anything whatsoever and which does not have anything intermediate), while, of the remaining opposites, some are relatives, some are opposed as possession and privation, and some are contraries. And, of relatives, those that are not contraries do not have any intermediate: the reason for this is that they are not the same genus.”
68 Cf. Castelli 2018, xxxi.
This fact is illustrated in the following passage from *Met. X.5*:

(III) Consequently, those do not assess the matter correctly who consider that all things are said similarly, in such a way that what is neither shoe nor hand will be intermediate between shoe and hand, if it is also true that what is neither good nor bad is intermediate between the good and the bad, as if there were going to be some intermediate between any two things. But there is no necessity that this turn out to be the case. For there is a joint negation of the opposites for those things for which there is some intermediate and which are by nature such as to have some distance between them. But no difference obtains between those other relata [i.e contradictories]: for the things that are jointly negated are in different genera, so that the subject is not one. 69

Clearly contradictory oppositions are the topic of this passage, and Aristotle is distinguishing contradictories from contraries. The passage also gives us a test for whether or not an opposition is *per se* or accidental through discerning whether or not an opposition can admit of intermediates. How does the example of the intermediate prove this? Take any two relata that can be opposed such that the affirmation of one requires the negation of the other. Since we are following Aristotle, let us take the example of a shoe and a hand. Then we take any third thing which has a joint negation of both the hand and the shoe, say a dog. While it is true that the dog is neither a shoe nor a hand, it would be absurd to say that because the dog has a dual negation of both shoe and hand it must be an intermediate between them. What this tells us is that all we need to understand that two things are opposed to one another as contradictories is that the affirmation of one necessitates the negation of the other. We have no need to know anything about the *per se* properties of the relata.

The same is not true for contraries. For two relata that are opposed as contraries must be within the same genus, and in fact must be extremes within that genus. 70 Therefore, we can only know that two relata are extremes when we know their common genus. Intermediates are such because they also fall under the same genus but are defined in part by a joint negation of the contraries. So, if a pair of opposites have an intermediate, then they must be within the same genus. This last point is made apparent when Aristotle denies that contradictories have an intermediate, saying that “no difference (*diaphora*) obtains” between them. This difference is the specific difference from which the joint negation of the extremes flows. Therefore, when we know that two relata are contraries, then it follows that they share a genus, which is a *per se* property of the relata (since nothing belongs to a genus accidentally), which further entails that they are opposed *per se*. But this is not the same for contradictories. Therefore, contradictories are not the same as contraries.

Aristotle confirms this difference between contradictories and the other three types of opposition in *Met. X.7*. He writes:

(IV) Of opposites, there is no intermediate in a contradiction (for a contradiction is this, namely an opposition such that one part or the other is present in anything whatsoever [*hotōioun*] and which does not have anything intermediate), while, of the remaining opposites, some are relatives, some are opposed as possession and privation, and

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69 *Met. X.5* 1056a30-1056b2.
70 Cf. *Met. X.4* 1055a8-10.
some are contraries. And, of relatives, those that are not contraries do not have any intermediate: the reason (aition) for this is that they are not in the same genus.71

Note that contradictories can arise between any two things whatsoever. This language is almost exactly the same as the language Aristotle uses in the argument of *Phys*. I.5 to exclude accidental relata in natural change. It also confirms that relatives within the same genus are called contraries. It is notable that intermediates play a central role in proving the sameness of genus for contraries: if relata can have an intermediate, then they are in the same genus and are contraries.

What we have seen is that even though there are four categories of opposites, we can split them into *per se* opposites and accidental opposites. All *per se* opposites are called by Aristotle “contraries” in the above passages. So, when Aristotle excludes all accidentally related relata, everything that is left can either be called a contrary or an intermediate of a contrary, since all *per se* relations in the list of four oppositions are either called contraries or their intermediates. Therefore, if we take the inference from (1)—(3) to (4) as a disjunctive syllogism for an argument from elimination we can see why the exclusion of accidents as principles of nature necessarily results in contraries.

To make this clearer, I propose the following emendations to the argument formulation I presented earlier so that it includes explicitly what Aristotle presumed implicitly. My additions will be listed as letters rather than as numbers to indicate that they are not explicitly expressed in the text of *Phys*. I.5:

A) All change is between opposites.
B) All opposites are either contrary opposites or accidental opposites.
   1) No being naturally acts or is acted upon by happenstance.
   2) No being naturally is generated into just anything whatsoever.
   3) No being naturally corrupts into just anything whatsoever.
C) Therefore, no change between accidentally opposed relata is a natural change.
   4) Therefore, every instance of natural change is either from contraries or intermediates of contraries into contraries or intermediates of contraries.
   5) All intermediates are from contraries.
   6) Therefore, every instance of natural change is from contraries or into contraries.

This new formulation of the *Phys*. I.5 argument shows clearly the fact that this is an argument from division. Premises (A) and (B) are from our investigation into opposites in *Met.* X. The reason for adding (B), in particular, is to identify the members of the disjunction for the argument from division. I have formulated these two premises so that they are inclusive of natural and non-natural changes. The reason for this was because, as we have seen, Aristotle does admit of chance occurrences, but he says that chance changes are accidental changes. Therefore, (A) and (B) do not target natural change yet but are descriptive of all changes. When we get to premises (1)—(3), we see that Aristotle is clearly defining natural change as excluding all accidental relata of change. Thus, given the exclusion of all accidental opposites in premises (1)—(3), (C) follows. The importance of (C) is that it shows how the conclusion (4), which was mysterious in the original argument, follows from the elimination of one of the members of the disjunct in premise (B).

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71 *Met.* X.7 1057a33-38.
What this investigation into the workings of the argument of *Phys. I.5* has told us so far is that natural change is always between things that are related per se. This is because changing objects are related on the level of genus. So, if we are going to discover a difference in kinds of change it would make sense that there would be specific contraries associated with the different kinds of change. That is why in the later chapters of this project I will search for difference in the contraries in order to identify the differences in kinds of change that occur at each level of being.

However, we are not yet done with the argument of *Phys. I.5*. There is the question of how intermediates are “from” their contraries. We have seen above that intermediates are within the same genus as the contraries, and it is precisely this sameness in genus that allows for intermediates to be “between” the contraries. It is also why intermediates remain after Aristotle excludes all accidentally related relata from natural change. But what is it about the intermediates that makes them “from” their generic contraries, as premise (5) insists? That is what we must examine next.

### 1.5: Reducing intermediates to contraries

What makes premise (5) especially difficult is that Aristotle ultimately concludes that the contraries that are principles of nature are oppositions of form and privation. Yet Aristotle says that intermediates are “from the contraries” (*ek tôn enantiōn*), and most scholars interpret this as meaning that intermediates are “composed” of their opposites, as if any intermediate were just some mixed ratio of the two contraries. But it is hard to imagine how something and the privation of that same thing can be mixed together. The problem is captured by Judson in the following way: “Even when [Aristotle] characterizes contraries in terms of [hexis] and privation in *Metaphysics* [X], he says that intermediates are ‘composed’ of the two contraries: this difficult idea only begins to make sense if we think of the intermediates as a blend of two causally efficacious ingredients, rather than as a blend of a form and its absence.”

72 Judson 2018, 147.

73 Castelli 2018, 84.

74 All of
this leads Aristotle to conclude that (4) “The primary contrariety is possession (hexis) and privation—not any privation . . . but whichever privation is complete.” This conclusion follows because, given some property, the having of that property in its fullness will be one complete extreme and the total deprivation of that property will be another complete extreme. This certainly seems like a form and its absence. Now, Judson can still say that the causal ingredient represented by the absence of a form just is something else acting on the form, and indeed that does seem to be the line Judson takes. But Judson himself agrees that this interpretation does not mesh with what comes in Phys. I.7 and 9. He does not try to resolve the apparent contradiction, but instead explains it as a result of Aristotle’s need to affirm the common view of his predecessors.77 Judson’s response would be the right one if we had to understand “from the contraries” in terms of composition. But there is good evidence that we are not forced to understand the relationship of intermediates to their contraries in this way.78

Note, it is not the partial presence of the extremes in an intermediate that make it a “middle” between the two extremes. Rather, Aristotle says that what makes these intermediates to be such is that when you change from one extreme to another, the changing substrate must first become the intermediate before becoming the opposite extreme.78 Aristotle says this at the beginning of Met. X.7:

(V) For we say that those things are intermediate, into which what changes necessarily changes into before changing into the opposite (for instance, if something moves from the lowest note to the highest note through the smallest <interval>, one will reach the intermediate notes before <coming to the highest>; and in the case of colors, if something <moves> from white to black, one will reach red and grey before coming to black; and similarly in the other cases, too.79

Again, in the key part of this passage what makes the intermediate an intermediate is that, when moving from one extreme to another, the subject must first change into the intermediate before changing into the opposite extreme. To understand what is going on here, I think we need to reject the notion that “composition” is the correct way to express what Aristotle is talking about when he says that the intermediates are “from” the extremes. This investigation will also give us

also the biggest. But the biggest in each genus is complete. Biggest is that which cannot be exceeded, and complete is that beyond which it is not possible to take anything.” (Met. X.4 1055a7-12)

75 Met. X.4 1055a33-35.
76 “On the other hand, later in Physics I Aristotle seems willing to treat privation as simply the absence of form: see 7.191a5-7 and 9.192a3-5.” (Judson 2018, 147)
77 “Perhaps Aristotle finds the appeal to opposites at the fundamental level in the natural philosophy of his predecessors (as he understands them) to be so pervasive that he cannot bring himself to suppose that this appeal is utterly wrong: he would rather make (or try to make) his own distinction of form and the formless conform to this universal pattern than to suppose that what everyone thinks is simply false.” (Judson 2018, 149)
78 μεταξοῦ δὲ εἰς ὅ πέρῳ πρότερον ἀφανεσθαί τὸ μεταβάλλον ἢ εἰς ὅ ἐσχάτον μεταβάλλει κατὰ φύσιν συνεχὸς μεταβάλλων. (Phys. V.3 226b23-25) NB: I have given the Greek text here and not just the reference because the location of this particular text is complicated in the critical editions by a rearrangement of Cornford that Ross accepts (Cf. Ross 1936, 627). For those working in translation, the Oxford translation is particularly confusing, and this text is nearly impossible to find. The Apostle 1980 translation is much better for consultation.
79 Met. X.7 1057a22-26. The words in brackets are supplied by Castelli, but I agree with her translation decisions. Jaeger’s critical edition presents the text as: μεταξοῦ μὲν γὰρ ταύτα λέγομεν εἰς δόσα μεταβάλλειν ἀνάγκη πρότερον τὸ μεταβάλλων (οἷον ἀπὸ τῆς ὑπάτης ἑπὶ τὴν νήπην εἰ μεταβαίνοι τὸ ὄλγαστο, ἤξει πρότερον εἰς τοὺς μεταξοῦ φθόγγοις, καὶ ἐν γρομασίαν εἰ [ὁξεὶ] ἕκ τοῦ λευκοῦ εἰς τὸ μέλαν, πρότερον ἤξει εἰς τὸ φωσικόν καὶ φαιόν ἢ εἰς τὸ μέλαν’ ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων).
a way to understand how the intermediates are reducible to the contraries, a notion of reducibility which will be important to keep in mind in our discussion of the mechanisms of change in the next chapter.

When translators and commentators understand Aristotle to be discussing “composition,” they think the notion is expressed in Greek as the particle *ek* (from or out of) plus a genitive of the thing(s) composing. But this same construction can indicate a wide variety of origins, not just origins from material components, which is normally what we mean when we talk about “composition.” When Aristotle discusses how the intermediates originate from the extreme contraries, I do not think he is intending the contraries as components of the intermediates. To see why I think this, note the language used to describe the relation between contraries and their common genus:

(VI) And if there is to be a genus in such a way as to be something prior to the contraries, the differences which produce the contrary species (i.e. the species of the genus) will be prior and contrary: for the species are from the genus and the differences (*ek gar tou genous kai tõn diaphorôn ta eidê*) (e.g. if white and black are contraries, and the first is piercing color whilst the latter is contracting color, these differences, i.e. piercing and contracting, are prior; so that these are contrary to each other and prior).  

Notice that when Aristotle is describing the contraries, he describes them as from the genus (*ek* + gen.) and specific difference. He even gives an example of this relation using white and black saying that white is “piercing color” and black “contracting color.” I admit that the differences he picks out are rather mysterious, but what is being exemplified is not. Contraries are specified by differences, and the “from” relation here is how a specific difference is from a genus. This language is very common in Aristotle, but it is not normally understood in terms of composition. When we think of a “human” as “rational animal” we do not think of “animal” and “reason” (*logos*) as parts composing some whole. They are, instead, understood to be parts of the essence.

With that in mind, notice how Aristotle goes on to describe intermediates. He writes:

(VII) (a) And the remaining <contraries> and the intermediates will be from the genus and the difference (*ek tou genous estai kai tõn diaphorôn*) (for instance, those colors which are intermediate between white and black, these must be said to be from the genus (*ek te tou genous*)—and the color is the genus—and from some difference (*ek diaphorôn tinôn*); (b) but these will not be the primary contraries: otherwise each <intermediate color> will be either white or black; (c) therefore <the differences out of which intermediates species are> are other differences (*heterai ara*); (d) and therefore these will be intermediate between the primary contraries (*metaxu ara tõn*).

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80 For example, note Aristotle’s use of *ἐκ* in APo. I.27 87a31-37: Λεγόμενα δ’ ἐπιστήμη ἐπιστῆμης καὶ προτέρα ἢ τε τοῦ ὄτι καὶ διώτι ἢ αὐτῆ, ἄλλα μὴ χωρίς τοῦ ὄτι τῆς τοῦ διώτι, καὶ ἢ μὴ καθ’ ὑποκειμένου τῆς καθ’ ὑποκειμένου, οίνον ἀριθμητική ἀριμονικῆς, καὶ ἢ έξ ἐλαττών τῆς ἐκ προσθέσεως, οίνον γεωμετρικά ἀριθμητικῆ. Λεγόμενα δ’ ἐκ προσθέσεως, οίνον μονάς οὐσία ἄδετος, στιγμὴ δὲ οὐσία θετός ταύτην ἐκ προσθέσεως. Clearly the *ἐκ* + gen. construction here is not indicating composition relation to the premises. Thanks to Ian McCready-Flora for pointing out this parallel passage to me.

81 Met. X.7 1057b4-11.

82 This is possibly a relic of the Empedoclean view that seeing white was achieved through passages of fire while seeing black through passages of water. Cf. Kalderon 2015, 6-12.
prōtōn enantiōn hautai esontai], and the primary differences are piercing and contracting).\(^{83}\)

Notice that in (VII)(a), the same formula (ek +gen.) is used to describe the origin of the intermediates from the genus and the differences. Right away we see that the intermediates are from the contraries in the way that the contraries are from the genus and specific difference. But in (VII)(b) Aristotle is insistent that the differences that specify the intermediate colors are distinct from white and black themselves. Otherwise, all colors would just be white or black. So, he concludes in (VII)(c), rather laconically, that the differences are “other.”\(^{84}\) And in (VII)(d), the intermediates are “between” the two contraries. I think that if we clarify what Aristotle means in (VII)(c)-(d) by “other” and “between” we will have a much better sense of what it means for the intermediates to be “from” the extremes.

As I understand it, the “other” difference that specifies the intermediates cannot be a mere ratio of black and white. Text (VII) gives us a reason for thinking this when it explicitly denies that black and white can be the differences that specify the intermediate color. Rather some new difference is introduced that is neither black nor white. While Aristotle does not say as much here, a new difference that falls under the same genus as white and black must have a “dual privation” of both extremes. He says this explicitly when discussing the nature of “equals” in Met. X.5. To be equal, a thing must be neither “greater” nor “lesser.” If we take “greater” and “lesser” to be extremes, then the “equal” is a privation of both extremes because a thing is unequal whether it is greater or lesser. “The equal, then, is that which is neither great nor small and is naturally fitted (pephukos) to be either great or small; and it is opposed to both as a privative negation (and therefore is also intermediate).”\(^{85}\) The point I want to highlight is the sense of “natural” fittedness. This is a natural potency to be great or small, and only the equals can have this dual potency when it is neither great nor small intermediate colors are similar. They are neither white nor black, but opposed to both while being “naturally fitted” (read “essentially related”) to be both. Intermediates have a potency to be black or white because they are neither black nor white. This natural relation is part of what it means to be a particular color, like red, yellow, blue, etc. Each color is some sort of privation of both black and white, and that privation may differ in each color by a certain ratio. Nevertheless, there is a distinct property (redness, blueness, etc.) that specifies it under the genus of color.

These privative ratios naturally fit the colors between the extremes. But what does it mean to be “between” in this sense? If we consider what Aristotle says in text (V), it seems that the colors are “between” the extremes in the sense that when one thing changes from white to black, it first must change into the intermediate colors. At first blush, this suggestion seems wildly implausible, since there are presumably an infinite number of colors between white and black. But it becomes more plausible if we consider that Aristotle does not think that all intermediate colors are made equal. Just like color theorists today, he accepts that some colors are primary, while others are secondary, tertiary, etc.\(^{86}\) In this case, white and black would be the primary colors, and the others would be secondary or tertiary. Aristotle says that just like concords can be differentiated by whether or not their ratios are simple or incommensurable, so

\(^{83}\) Met. X.7 1057b12-19.

\(^{84}\) All of (VII)(c) is just two words: ἐτεραὶ ἄρα. I cannot fault Castelli for inserting an entire phrase to fill out the sense, and I think that her insertion is certainly the correct interpretation.

\(^{85}\) Met. X.5 1056a22-24.

colors can be distinguished by whether or not their proportions of white and black are simple or incommensurable. On this view, it is plausible to consider secondary colors as intermediates of primary colors and tertiary colors as the intermediates of the secondary colors. So, if something white must become the intermediate colors before becoming black, Aristotle need not mean every possible color, but only the secondary colors, which in text (V) he lists as red and grey, but in De sensu as red, purple, green, blue and either grey or yellow (he leaves that last one an open question). Whatever the actual list of secondary colors is need not detain us. The point is that to change into the secondary colors, and not the tertiary or other n-ary colors, it is sufficient to limit the number of colors that must be changed into on the way from one extreme to the other.

With that in mind, we can now see why premise (5) follows. The intermediates are all from the contraries. However, the meaning of “from the contraries” (ek tôn enantiōn) is not just specifying that the intermediates are found between the contraries, but that they are from the contraries like the contraries are from the genus. As noted above, the intermediates are a proportion of the primary contraries, even though there is some new specifying difference that determines the specific intermediate and its proportion of the extreme contraries. It is this proportion of the extreme contraries that makes the intermediates to be members of the same genus as the extremes. So red, purple, green, and blue are colors in part because they have a proportion of black and white as part of their essences. Therefore, the reason why change can happen from intermediates into intermediates is because they share in the extremes, which makes them part of the same genus. So, the potency to change from one intermediate to another is rooted in the extreme contraries. To flesh out the sense of how the extremes can have a proportional presence in the intermediates we will need to understand certain features of reducibility, which I will discuss in chapter two, and potential presence, which I will discuss in chapter three. But for now it is sufficient to note that intermediates have a dual privation of both extremes, but are intermediate because changing from one extreme to another requires changing into the intermediates first. With this understanding of intermediates we can see why Aristotle accepts premise (5), because the being of an intermediate is dependent upon its share in the primary contraries, whereas the being of the primary contraries is not at all dependent upon the intermediates. What this means is that when an intermediate changes, even if it changes into another intermediate, there is always a change from or into a contrary, because all intermediates have a proportion of the contrary as a per se property. Therefore, all change comes from and into a contrary, and in this way the intermediates can be reduced to their contraries.

1.6: Conclusions about contraries

We have now examined the argument in Phys. I.5 about natural change and we have seen why it concludes that all generation, corruption, and alteration is either from contraries or into

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87 Cf. DS 442a20-25. A second point to consider is related to actual color mixing. All painters know that black is obtained either by a mixture of all three primaries or by mixing two complementary colors, which is de facto a mixture of all three primaries. On this last point, take, for example, red and green, which are complementary colors. Green just is a mixture of blue and yellow, and so to mix red and green, one is de facto mixing all three primaries. So, maybe Aristotle does not mean that a white thing becomes black first by becoming yellow, then red, then blue, etc. He could mean it becomes yellow and then, without losing its yellow quality, takes on a red quality, and then, without losing the other two, it takes on the third primary, blue. However, this is speculation, which is why I am relegating it to a footnote. For an alternative view on the theory of hues in Aristotle, see Kalderon 2015, especially 124-131.

88 Cf. 2.3 and 3.2.1 respectively.
contraries. We have also examined what intermediates are and how they are essentially related to their extremes. The reading of intermediates is of central importance to the rest of my project, because it will help us to see when a property is not an intermediate or extreme, and therefore a new object determining a new faculty. Since change happens between contraries, and contraries are species within a genus or kind, then we should be able to distinguish different kinds of change by identifying different kinds of contrarieties that determine a natural spectrum of change. If there are spectrums of natural change that are not related in terms of a common genus, then they are different kinds of change. Therefore, we will be able to discern whether or not a new faculty ought to be categorized under a new kind of change based upon whether or not the contraries that are at work in the change of the faculty belong to a new genus or not.

But this task is made difficult by the fact that we must discern differences in the meaning of “contrariety” itself. Since all natural change is from contraries or to contraries, then if there are different kinds of change there will also be different kinds of contraries. But what counts as a different “kind” of contrary? I am proposing that we can sort kinds of contraries based upon the mechanisms of change appropriate to each kind of contrary. After all, it is not sufficient for understanding change simply to know that change happens between contraries. Presumably there is a way that the contraries interact that is characteristic of the change. If we can discover different mechanisms characteristic of different kinds of change, then we will have a clear description of why certain faculties belong to particular levels in the scala naturae.

The remainder of this dissertation will be an examination of contraries and the differences in kind thereof. In order to set the stage for this consideration, we must first understand the contraries behind the most basic kinds of natural changes and establish that basic kind of natural change as the unit which we can use to determine whether or not a new pair of contraries belongs to a new level in the scala. Since all natural change that Aristotle investigates is a change in body, then the most basic kind of natural change must be characteristic of all bodies in general. Therefore, in the next chapter we will see what is characteristic of the mechanisms of all bodily change.
Chapter 2: Natural Bodily Change and Its Contraries

“The science which has to do with nature clearly concerns itself for the most part with bodies and magnitudes and their properties and movements, but also with the principles of this sort of substance, as many as they may be. For of things constituted by nature some are bodies and magnitudes, some possess body and magnitude, and some are principles of things which possess these.” (De caelo I.1 268a1-6)
2.1: Introduction

The previous chapter showed that we must understand natural change in terms of contrariety. The point of that discussion was to determine what we should be looking for in characterizing natural change and its kinds. Having seen why it is that contraries and their intermediates are central to natural change, we are now in a position to understand the different kinds of change. Where ought we to begin our investigation?

It is fitting that we begin with the contrarieties that are common to all bodies. Why? As we move up the scala naturae, each step in the scala includes the powers of the previous step. For example, plants have the powers of change associated with the vegetative soul, but they also have the powers associated with non-living bodies. It is fitting, then, to begin with the most common powers and move to the least common. For this reason, it seems a natural starting place to identify what kinds of change are common to all bodies qua bodies.\(^89\) The place where Aristotle discusses the primary contraries of basic corporeal change is in the De generatione et corruptione (GC). There Aristotle investigates generation and corruption across all bodies and discusses in depth the so-called elements of body.

2.2: Discovering the essential contraries of all bodies

The first thing we need to establish is that Aristotle understands natural bodily interaction in GC as requiring contraries, just like he held in the Physics. We see this confirmed in the following passage:

(I) But since no chance thing naturally (pephuken) does something or suffers something, but whatever either has contraries or is a contrary, it is necessary that what does something or suffers something is like in genus, i.e. the same [in genus], and unlike in form, i.e. contrary [in form].\(^90\)

Both H. Joachim and T. Buchheim see text (I) and others like it to be referring back to Phys. I.5-7, and for good reason.\(^91\) The language of this passage, which discusses things that act or suffer naturally as opposed to chance, is strikingly similar to premise (1) of the Phys. I.5 argument that I examined in chapter one.\(^92\) More significantly, the inference in this passage does not make sense outside of the theory of contrariety we used to understand the validity of the Phys. I.5 argument. The argument in text (I) can be reconstructed in the following way:

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\(^89\) As I indicated in the last chapter, all accidental and chance changes are also rooted in the changes natural to bodies qua bodies. That also means that artifacts and their functions and abilities to change are rooted in the natural powers of bodies qua bodies. While I will not be considering those changes in this dissertation, we could use the lessons in this chapter to explore issues of change with respect to artifacts.

\(^90\) ἀλλ' ἐπεὶ οὐ τὸ τυχόν πέφυκεν πάσχειν καὶ ποιεῖν, ἀλλ' ὡς ἡ ἐναντίωσιν ἔχει ἡ ἑναντία ἑστίν, ἀνέγκη καὶ τὸ ποιοῦν καὶ τὸ πάσχον τῷ γένει μὲν ὄμοιον εἶναι καὶ τῷ ταύτῳ, τῷ δ' εἶδει ἄνομοιον καὶ ἑναντίον. (GC I.7 323b29-32) The translation is mine. In addition, Aristotle makes this same point in Met. X.6.

\(^91\) Cf. GC I.3 317b13-14. Joachim 1922 and Buchheim 2010 in loc. cit. both indicate that the oblique reference here is to Phys. I.5-7. Rashed 2005, claims it is a reference to De Cael. III.2 301b32-302a9. However, I agree with Buchheim that this claim is unconvincing.

\(^92\) Compare: “καὶ τῆς πάντων τῶν ὄντων ὡς ὡς ποιεῖν πέφυκεν καὶ πάσχειν τὸ τυχόν ὑπὸ τοῦ τυχόντος” (Phys., I.5 188a31-33) with “ἀλλ' ἐπεὶ οὐ τὸ τυχόν πέφυκεν πάσχειν καὶ ποιεῖν” (GC I.7 323b29-30).
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(1) If something naturally does or suffers something, then it does so at the hands of what is contrary to it or acts on what it contrary to it.
(2) Therefore, it is necessary that whatever does or suffers something must be like the thing it interacts with in genus, but contrary in species.

This inference looks invalid. But we can use our discussion of Met. X to provide a missing premise that makes it valid. As we discussed in chapter one, all contraries are similar in genus. That means that Aristotle presumes the premise “Contraries are like in genus but contrary in species.” Therefore, we can reformulate the argument to say:

(1) If something naturally does or suffers something, then it does so at the hands of what is contrary to it or acts on what it contrary to it.
(2) Contraries are like in genus but contrary in species.
(3) Therefore, it is necessary that whatever does or suffers something must be like the thing it interacts with in genus, but contrary in species.

The added premise clearly makes this a valid argument. It seems, then, that the best way to make sense of the argument in this passage is to use Met. X just like we did with Phys. I.5. What this means is that when we look at Aristotle’s theory of natural bodily interaction, we must use the theory of contrariety.

How does Aristotle begin his search for the contraries of natural bodily change? He starts by considering what is necessary for mutual interaction between bodies. He writes:

(II) (a) But if we must investigate action and passion and combination (mixis), we must also investigate contact (haphēs). (b) For action and passion (in the proper sense of the terms [kuriōs]) can only occur between things which are such as to contact one another (hapsasthai allēlōn); (c) nor can things enter into combination at all unless they have come into a certain kind of contact (hapsamena).

He argues that objects can only interact when they can come into contact with one another. Text (II)(b) observes that contact is a necessary condition for action and passion to happen. Text (II)(c) observes that contact is also a necessary condition for mixing to occur. Therefore, any investigation into these activities will require some investigation into how contact effects interactions between bodies. Aristotle then induces from these observations the following universal principle:

(III) All things which admit of combination (mixis) must be capable of reciprocal contact (allēlōn haptika); and the same is true of any two things, of which one acts and the other suffers action in the proper senses of the terms. For this reason we must treat of contact first.

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94 GC I.6 322b21-25. Oxford translation, with a light modification making the translation of ἅψασθαι the same throughout. Unless otherwise noted, I will be using this translation.
95 GC I.6 322b26-29.
Again, this is a reasonable conclusion considering that he wants to understand how objects that act on other things and objects that suffer action from other things interact with one another. Interaction does generally require some sort of mutual contact, so identifying contact or touch (haphēs) as the domain in which to begin our search for the basic contraries of bodily change is reasonable. However, just seeing that this step is reasonable does not explain Aristotle’s certitude that the basic contraries of bodily change are tangible contraries. To understand why Aristotle is certain that the tangible contraries are the most basic contraries of bodily change, let us briefly examine some similar texts from other works of natural philosophy that can clarify the foundations of his certitude.

2.2.1: Why the basic contraries of bodily change are tangible properties

First, notice that the focus on contact gives us another connection to the Physics. For in GC I.6 Aristotle reiterates the definition of touch (haphēs) that he offers in Phys., V.3 226b1-3. He defines it in GC as “having extremes together” (to eschata echein hama). Only objects whose boundaries can come together are the objects that can interact and mix with one another. This may seem like a small point, but it is important to highlight because keeping this definition in mind will help us to understand both the reason why Aristotle identifies hot, cold, wet, and dry as the basic contraries, and also why he gives them the unusual definitions that he does. For, as we will see, at least two of the basic contraries are defined as qualities related to the boundary of a body. So, if contact is a necessary condition for interaction and mixing, and certain qualities have a determinative effect on contact between bodies, then those qualities in particular are prime candidates for the primary qualities of body. By definition, these qualities must be tangible qualities.

Before he begins his investigation into the primary qualities in earnest, Aristotle offers one more necessary condition for bodily interaction: that the qualities must be of sensible bodies. He writes, “For coming-to-be and passing-away occur in naturally constituted substances only given the existence of sensible bodies (ouk aneu tōn aisthētōn sōmatōn).” The premise here is as follows:

(A) If there is generation and corruption, then there are sensible bodies

This premise is a bizarre claim, even if it seems plausible at first glance. What makes it bizarre is that it is not immediately obvious why bodies that generate and corrupt also have to be sensible. After all, it seems plausible that generation and corruption could happen in a world of nonsensible bodies. One might think that my worry is unimportant and that my emphasis on the sensible character of bodies that enter into mixtures ought not to distract us. For we want to focus on the principle of generation and corruption, not the principle that makes a body sensible, regardless of the connection between sensibility and changeability. In response to that objection, note what Aristotle says in GC II.2:

(IV) Since perceptible is equivalent to tangible, and tangible is that of which the perception is touch, it is clear that not all the contrarieties constitute forms and principles of body, but only those which correspond to touch. For it is in accordance

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96 GC I.6 323a4.
97 GC II.1 328b32-33.
with a contrariety—a contrariety, moreover, of tangible qualities—that the primary bodies are differentiated.  

This is not just a principle Aristotle upholds in *GC*, for he also affirms this reasoning in *DA* as well, where he writes:

(V) The objects of touch are then distinguishing features of a body insofar as it is a body.  

As text (IV) and (V) indicate, the perceptible character of bodies is not unrelated to what makes a body a body. Aristotle says that the perceptible is equivalent to the tangible because the sense of touch is the most fundamental among the senses. Aristotle affirms this statement in *DA* II.3, for he notes that animals can have the sense of touch without the other senses, but they cannot have the other four senses without the sense of touch. What texts (II)—(V) show us is that there is an intimate connection between what makes something able to undergo change and what makes something able to be sensed, and it has to do with tangibility or contact. Why is that the case?

The reason is that a magnitude is necessarily tangible, and natural bodies are all magnitudes. Aristotle emphasizes this point in *Phys.* VI.1, where he insists that for two bodies to interact they cannot be composed of indivisible points. It is only by virtue of being a divisible magnitude that bodies can come into contact with one another since it is only by virtue of being a magnitude that bodies can have parts, and therefore it is only by virtue of being a magnitude that bodies can have extremes or boundaries. Since clear boundaries are necessary for contact and continuity, then bodies must be magnitudes. This line of reasoning may seem obvious to us, but it was not necessarily so in 4th century Athens. By this line of reasoning Aristotle is denying Democritean atomism as well as the Platonic notion of indivisible lines or planes. Regardless, the principal point is that both change and the ability to be perceived are potencies rooted in the ability to come into contact with other bodies, which is only something a magnitude can do. What this means for our investigation is that the primary contraries of bodies must be qualities that have to do with magnitudes and their ability to come into contact with other bodies.

### 2.3: The primary contraries of bodies

As we have seen, Aristotle identifies tangibility as central to bodies *qua* bodies, and so he identifies the tangible qualities as the class of contraries to which the primary contraries of sensible bodies belongs. Therefore, to begin his investigation, Aristotle presents a list of tangible contrary qualities that are candidates for the primary contrarieties: hot/cold, dry/moist, heavy/light, hard/soft, viscous/brittle, rough/smooth, coarse/fine. Unfortunately, he does not go through a process of elimination for each pair. Instead he moves almost immediately to state why the contraries hot/cold, dry/moist are the primary contraries. This makes it difficult to see why he

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98 Ἐπεὶ οὖν ἔχουσιν ἀυτῆσθαι σῶματος ἄρχας, τοῦτο δ’ ἐστὶν ἀπτική, ἀπτὸν δ’ οὗ ἡ αἴσθησις ἁφή, φανερὸν δ’ αἱ ἐναντίωσις σώματος ἁφή, ἀλλὰ διάφορον ἐναντίωσιν τε γάρ διαφέροντα, καὶ κατὰ ἀπτήν ἐναντίωσιν. *GC* II.2 329b6-10.

99 *DA* II.11 423b27.

100 *DA* II.3 415a3-6.


102 Aristotle used the notion of contact to refute Democritus by name and the Platonic notion of indivisible lines by description in *De Cael.* III.7. He uses it to refute the Platonic notion of indivisible planes in *GC* II.1.
identifies these four qualities as the primary ones. Is it possible to discern the reason behind his choice? I think so. It is important to discern this reason, otherwise Aristotle’s choice of contraries will seem groundless. I think that the answer is in the definitions that Aristotle gives for these particular qualities. Aristotle defines them in the following way:

(VI) Hot is that which associates things of the same kind (for dissociating, which people attribute to Fire as its function, is associating things of the same class, since its effect is to eliminate what is foreign), while cold is that which brings together, i.e. associates, homogeneous and heterogeneous things alike. And moist is that which is indeterminate in itself, but readily determinable; while dry is that which is readily determinable by its own limit, but not readily determinable in shape.\(^{103}\)

Notice how all of these definitions can be predicated of any magnitude. For wet and dry are properties of the boundary, the place of contact, whereas hot and cold are properties of attraction between bodies, i.e. the cause of contact. Each of these definitions have implications for how the qualified bodies will interact with one another. Yet, despite the importance of these definitions for the operations of the qualities, as far as I can tell no one in the modern era has tried to understand the relations between the primary qualities specifically in terms of their definition. Most accounts only make use of the fact of opposition between the qualities in their reconstructions of Aristotle’s theory of elemental change.\(^{104}\) But the mere fact of opposition does not explain the mechanisms of interaction between bodies and, as we will see, it is precisely the lack of understanding the mechanisms of change that leads to many interpretive problems. For instance, the lack of attention to the definitions of the primary qualities has led at least two scholars to reject an obvious reading of the relationship between primary and subsequent qualities.\(^{105}\) I intend to show here how a careful examination of the definitions of the four qualities aids our understanding of how bodies interact by means of these qualities.

The implications for how the qualities allow for interaction between bodies is most obvious in the case of the moist and the dry. In text (VI), the definitions for wet and dry make reference to the boundary (horos) of a body, first in itself (oikeioi horoi) and then as it is susceptible to being adapted. In the case of the wet, its boundary is indeterminate (aoriston) but is readily determinable (euoriston), presumably by some other body. What this means is that a moist body is one that has no particular shape of its own, but receives its shape from the bodies that surround it. Just the opposite is the case for the dry, which determines its shape entirely on its own (eueriston oikeioi horoi), but is not easily determined (dusoriston) by other bodies. The absolute indeterminacy of a wet body’s boundary means that its shape is entirely determined by what surrounds it. Likewise, a dry body, say earth, determines its own shape irrespective of what

\(^{103}\) GC II.2 329b26-32. I have made some modifications to the translation a bit, giving “indeterminable” for “adaptable” in the Oxford translation of ἀόριστον. This modification shows the linguistic similarities with “determinable” (εὐόριστον) better.

\(^{104}\) For example, see Fine 1998, 129-131. There he derives rules of addition in order to explain mixture, but does not consider how these rules are related to the definitions of the qualities that are being added.

\(^{105}\) Cf. section 2.4, where I criticize Williams and Krizan’s rejection of the view that subsequent qualities stand to primary qualities as species to a genus.
surrounds it. These definitions also show that the properties are extremes, i.e. total indeterminacy as opposed to total self-determination.

The fact that these qualities describe the state of a body’s malleability with respect to the influence of other bodies is why they are properties of receptivity (pathētika). Wet and dry are “receptive” properties because they relate to the determination of the boundary of a body by another body, and the boundary is the place of contact between the two bodies. So, a body is more or less receptive of action from another body based upon the quality of its boundary. In the case of wet, there is extreme receptivity with respect to another body, since the boundary of a wet body is determined by other bodies. In the case of dry, there is extreme non-receptivity, since a dry body determines its own boundary. This is nevertheless a “receptive” (pathētika) property because it is a fact about receptivity with respect to other bodies. What is more, one can easily think of intermediate states for these qualities, where total boundary-self-determination and total boundary-other-determination are moderated to some degree. So, these properties fit into our understanding of contraries and are applicable to any body.

Then there are the properties of hot and cold. These properties govern interactions between bodies. In the case of heat, it associates (sugkrinon) things of like kind (homogenē), whereas cold brings together (sunagon), i.e. associates (sugkrinon), both things of the same kind (suggenē) and of different kinds (mē homophula). An example of how heat works can be seen with boiling salt water. By boiling the water away, the heat separates water and salt from one another allowing the salt to collect together and the water to collect together. An example of how cold works is made apparent by an ice cube and a towel. These are very different objects, but if you place an ice cube on a towel, the towel will stick to the ice cube. At first glance this differentiation between qualities that associate like and unlike things seems like an odd description and it is difficult to pinpoint which quality is the form contrary and which is the privation contrary. Identifying which contrary is the form and which the privation is essential for understanding how these two contraries can be “complete” in the sense required by our discussion of contraries in Phys. I.5 and Met. X. I think we can see how these properties are complete extremes if we understand hot and cold as properties that join things together and that they differ according to whether they have a proper object or not. Understanding this point will help us to see why hot and cold are primary contraries and not derivative contraries.

To understand what Aristotle is getting at, let us pretend that we know nothing about two bodies that come into contact. Then, let us ask this simple question: will the two bodies join together, or will they not? I understand Aristotle’s notions of hot and cold and how they “associate” (sugkrinein) as specifying when two bodies will join together. Aristotle uses it to mean this in other places. For example, when he is discussing Empedocles’s view in Metaphysics I.3 he notes that for Empedocles things are generated and corrupted by association (sugkrinein) and disassociation (diakrinein). And in Met. I.4, he says that when Empedocles’s Strife dissolves the world, the elements of fire are all “associated” (sugkrinein) together into one body. It seems that Aristotle is using the terms in a similar way here. The difference is that unlike Empedocles, association is not brought about by a disembodied force, but is a property of a

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106 This may be difficult to attribute to fire, but if we distinguish between rigidity and self-determination we will see that despite the erratic nature of fire, its shape is not determined by what surrounds it but it freely shapes itself, and so its boundary is self-determined.

So, these qualities govern when bodies associate with one another. The difference between the powers is that whereas cold will associate with whatever body it comes into contact, a hot body will only associate with a body like unto itself.

How does this understanding of hot and cold help us to determine which property is the having contrary and which the privation? Aristotle considers the “hot” the having quality. In this case what it “has,” positively speaking, is a proper object (antikeimenon) or opposite with which it will join. Put negatively, it has a restriction on the types of bodies with which it will associate. The cold, on the other hand, has no proper object, but joins with any body with which it comes into contact, whether it be like or unlike that body. In other words, it does not have a proper object or object of joining. So, we might say that a hot body has a proper object in its interactions whereas a cold body does not.

What makes these contraries active (poiētika) qualities is that they govern how the qualified body acts upon another. In the case of hot bodies, their actions are extremely specific, in that they only join with bodies like themselves. In the case of cold bodies, there is an extreme lack of specificity, and they join with any body with which they come into contact. This lack of specificity is what makes cold a “privation” quality as opposed to a “having” quality. Therefore, both qualities are active in that they cause interaction between bodies. So, the having and the privation contraries are related to objects of interaction, but both qualities are active because they determine what sorts of actions in which the body can engage. This may seem like a minor point, but understanding which qualities are active qualities and which qualities are passive qualities will play an important role in my reading of chemical interactions in the next chapter.

So far, we have seen how we can group the four qualities of hot, cold, wet, and dry into pairs of contraries, where one is the form contrary and the other the privation contrary. That is one of the necessary conditions for primary contraries, as Aristotle concludes in Phys. I.7. But we also noted in our discussion of Met. X.4 that the primary contraries must be “complete.”

So, what makes these pairs of contraries complete? That is not an easy question to answer. First we must remember that what makes a pair of contraries “complete” is that they are sufficiently defined in relation to one another, and with no other contrary as part of their definitions. That is opposed to intermediate contraries, which are called such because they come between the two extremes and therefore have a proportion of the primary contrarieties as essential parts of their nature. So, the color “red” is a distinct color, but as an intermediate color its definition is incomplete without understanding its proportional relation to the extreme colors of white and black. Complete contraries are such that the form contrary needs no further qualification to define it as a member of a class and the privation contrary is the simple absence of the form contrary.

A quick glance at the definitions of hot, cold, wet, and dry shows us that they meet this condition. When it comes to bodily interaction, a hot body has a proper object for the kind of

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108 We know these are properties of body and not disembodied forces because they are identified by Aristotle as “tangible” properties belonging to perceptible magnitudes.

109 This characterization is a strict binary, and we might wonder how a mixture between bodies that are partly like and partly unlike happens. I will go into detail about that process in the next chapter. Cf. 3.2.2 in particular. For our purposes here, I need to lean on the strict binary character of hot/cold interaction in order to outline the basic mechanisms of elemental change.

110 Cf. section 3.3.1 & 3.3.2.

111 Cf. Met. X.4 1055a7-12 and 33-35.

112 Cf. Met. X.7 1057b4-19 and my discussion of this passage in section 1.5 of the previous chapter.
body it can interact with, whereas a cold body does not. Any other type of restrictions on interaction will have to be less specific than hot and more specific than cold. So a body that cannot join with bodies totally unlike it, but can join with bodies that are partially like it, has a quality that is intermediate between the two extremes of hot and cold. Likewise with wet and dry. A dry body is the sole determiner of the shape of its boundary, whereas the wet body lacks completely any ability to determine the shape of its boundary. Any other way in which the boundary of a body’s shape can be determined must be some intermediate between total self-determination and total other determination. So, it seems that these contraries meet the completeness requirement, which is a necessary condition for the qualities to be primary contrarieties required by the *Phys.* 1.5 argument.

2.4: Some objections

Given Aristotle’s definitions of the four primary qualities, it now seems clear why they are, in fact, the primary contrarieties for all bodies. However, by understanding the four primary qualities as extreme contraries, it then follows that the other tangible qualities are intermediates between these extremes. Such an interpretation of the subsequent qualities is unintuitive given my theory of intermediates as new species with double privations of the extreme contraries. There are several objections that can be raised against my interpretation. I want to address some of those objections and use them to clarify the relationship between the primary qualities and the subsequent qualities.

The first objection is a puzzle that comes from an apparent contradiction between my understanding of intermediates outlined in the previous chapter and the description of the subsequent qualities in *GC*. In the previous chapter I claimed that Aristotle thinks intermediates are called such in part because a change from one extreme to the other requires that there first be a change into the intermediates on the way to becoming the other extreme. But in *GC* II, Aristotle does not say that to change from hot to cold one must become an intermediate property, but rather that the subsequent qualities “reduce” to the primary four. He writes: “It is clear, then, that all the other differences reduce to the first four, but that these admit of no further reduction.”

The complicating term here is that Aristotle says the other differences (i.e. the non-primary qualities) “reduce” (anagontai) to the first four. The language of “reduction” in the context of a discussion of primitives tends to direct contemporary minds to think about the reduced objects as being composed of the primitives in some way. The idea here is that once we know everything there is to know about the primitives and their interactions, we will be able

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113 My formulation here may seem too vague, since I say that hot bodies interact with other bodies of the “same kind” and I don’t specify what that same kind is. But this vagueness on my part is intentional. Remember that at this point we are examining the primary contraries, not the primary bodies. I cannot specify what kinds of body will be “like” the hot body in question until we specify what the particular hot body is. Remember too that thinking about “hot” in terms of our normal understanding of temperature is a mistake, and we should not think that being “hot” is the same from one body to the next. As text (VI) indicates, all “being hot” means is tending to associate with a like body, not “being 100˚F” or some other temperature. So, I have to be vague about what bodies are “like” the hot body because we cannot tell what constitutes likeness until we know what kind of body we are examining.

114 “Δῆλον τοίνυν ὅτι πᾶσαι αἱ ἄλλαι διαφοραὶ ἀνάγονται εἰς τὰς πρώτας τέτταρας. Αὗται δὲ οὐκέτι εἰς ἐλάττους·” (*GC* II.2 330a24-26)

115 For example, this is M-L Gill’s reading of the text in Gill 1989, 78-80.
to understand how to construct non-primitives from them. This seems to be a very different relationship indeed, one that is not that of an intermediate to extremes, but that of a composed object to its composing parts. Let us call this the composition interpretation of elemental qualities (CI). If the CI of elemental qualities is correct, then either I am wrong to construe the four primary qualities as contraries and the subsequent qualities as intermediates or my understanding of contrariety, developed in the last chapter, is flawed in a significant way.

To preserve my reading of Aristotle, I need to show that the CI is false. In that regard, it is helpful to examine the passage where Aristotle describes how the non-primary elements are related to the primary elements. He writes

(VII) Fine and coarse, viscous and brittle, hard and soft, and the other differentiae are from these [sc. hot/cold, wet/dry]. Since the ability to fill things is from wetness, because it has no boundaries but is easily bounded and follows the thing with which it is in contact, and the fine is able to fill things (because its particles are fine and that which has small particles is able to fill things; for the whole of it is in contact with the whole <of the other>, and that which is fine is very much of this sort), obviously fineness is from wetness and coarseness from dryness. Again, the viscousness is from wetness (for viscous is wetness affected in some way, e.g. oil); and the brittleness is from dry: for brittle is that which is completely dry, so that it solidifies due to lack of moisture. Further, soft is from wet (for soft is what retreats into itself and does not move elsewhere, which is what wet does—therefore, wet is not soft, but softness is from wetness), and hardness is from dryness: for what is hard and what is solid is dry.

This passage is strong evidence that the non-primary qualities are indeed intermediates. The key feature of the text that supports understanding subsequent qualities as intermediates is that they have a new property that is essentially related to one of the contraries, but is nevertheless distinct from that property. For instance, something is “viscous” in that it is wetness “affected in some way” (peponthos ti estin). This property will have a double privation of total wetness and total dryness as all intermediates do, but in this case it will be closer to the lack of determination of wetness than to the self-determination of dryness, and so we can consider it more a modification

116 Paul Humphreys helpfully describes this type of composition as “generative atomism,” which he describes in the following way: “Generative atomism in this basic form has both a synthetic and an analytic component. The synthetic component says (1) that there is a collection of elementary entities from which all other legitimate objects in the domain are constructed, (2) there is a fixed set of rules that govern the construction process, and (3) as a consequence of (1) and (2), all entities are either atoms or are composed of atoms. The analytic component asserts that any non-atomic object can be uniquely decomposed into its atomic components using an explicitly formulated set of decomposition rules.” (Humphreys 2016, 12)
117 GC II.2 329b31-330a11. Trans. Williams. I have modified the text slightly. Most of the modifications concern how I am translating the nominative + genitive construction in this paragraph.
118 This would violate synthetic condition (1) in a Humphreys-style generative atomism, since the collection of elementary entities would consist of the four qualities, and the novel quality is a distinct entity outside of that collection. It also violates the analytic component, since the new quality is cannot be decomposed into the atomic components of the four primary qualities alone. One could respond by trying to include the novel quality among the elementary entities and say that the intermediates are combinations of the novel quality plus one or more of the primary qualities. But if we do that, then the four primary qualities are no longer the collection of elementary elements and so we cannot explain how subsequent qualities are “from” the four primary ones.
of wetness than of dryness. So, viscosity is a new property that is essentially wet, but not entirely defined by its wetness. A similar modification of wetness is indicated by the explanatory gar clause for both the “fine and the “soft.” Here something fine or soft is identifiable as wet because it shares an activity characteristic of wetness. In the case of the “fine” it is the ability to fill things and in the case of the soft it is the fact that it “retracts into itself and does not move elsewhere.” Aristotle adds to the explanation of the soft by saying that the wet is not soft, but the soft wet. This means that the soft has an additional quality to wetness, while retaining properties of wetness in its essential characteristics. Considering my discussion of intermediates in chapter 1, this is something we would expect, because all intermediate properties have a new property that defines them while retaining an essential reference to the extremes. Brittleness in this passage poses a bit of a hard case for me, since Aristotle describes the brittle as “completely dry” (teleōs xēron), which makes it appear to be an extreme quality and not an intermediate quality. But notice that Aristotle indicates that something becomes brittle after first being wet. In fact, Aristotle indicates that the dryness of the brittle object is the natural result of something losing moisture.\textsuperscript{119} What this indicates is that the brittle body is a property of a body that is naturally wet, but by some process has lost its wetness. Brittleness, then, is a property closely aligned to dryness, but not identical with it. If brittleness was identical with dryness we would expect all dry things to be brittle, but they are not. Rather, it is only things that are wet by nature but are made dry by the removal of moisture that are properly called brittle. Therefore, the property of brittleness does have a necessary reference to both extreme contraries, and so is an intermediate property.\textsuperscript{120} I admit that these considerations only prove my reading to be plausible and do not exclude other readings definitively. So, I will provide more argument in favor of my reading in what follows.

To support my reading, we will have to bring in some comparison texts where Aristotle also uses the term for “reduction” (anagontai). This word is not common in the texts of Aristotle, and so the few texts where Aristotle uses the term are important for our understanding of the meaning of “reduction.”\textsuperscript{121} One passage where it is used in a way similar to our GC passage is in the Prior Analytics, when Aristotle describes the formal validity of syllogisms in the second and third figures. He says, “It is also possible to reduce (anagagein) all the deductions back into the universal deductions in the first figure.”\textsuperscript{122} The similarity between the passages is obvious, since Aristotle is indicating that the efficacy of the second and third figures is somehow dependent upon the first figure, just as we expect that the subsequent qualities would be dependent upon the primary elements. It seems reasonable to presume, then, that Aristotle is using reduction (anagagein) in a similar way in both places.

How does this comparison help to show that the CI of GC II.2 is false? One thing that becomes apparent in the Prior Analytics is that the subsequent figures that reduce to the 1\textsuperscript{st} figures cannot be “composed” of the 1\textsuperscript{st} figure. If the subsequent figures were composed of the elements of the first figure syllogisms, then we could expect that the premises of the 2\textsuperscript{nd} and 3\textsuperscript{rd} figure syllogisms have equivalent premises to those of the 1\textsuperscript{st} figure syllogisms to which they reduce. While one could make a case that through conversion rules we can transform most of the 2\textsuperscript{nd} and 3\textsuperscript{rd} figure syllogisms back into a first figure syllogism by converting some of their premises, we cannot do so with at least two: Bokardo and Baroko. These two can only be

\textsuperscript{119} Note that “وضوع και πεπηγέναι δι' ἐλλειψιν ύγρότητος” is a natural result clause.
\textsuperscript{120} Compare this passage with GA II.1 734b31-36.
\textsuperscript{121} The term is so infrequent, in fact, that Bonitz does not have an entry for it in the Index Aristotelicus.
\textsuperscript{122} APr. I.7 29b1-2. I lightly modified the translation.
“reduced” by contradiction, not in the straightforward manner of using conversion rules to rearrange the premises to make a 1st figure syllogism out of premises consistent with the original ones. In reduction by contradiction, one introduces a premise that is the contrary to the conclusion in order to show the impossibility of the falsehood of the conclusion of a proper Bokardo or Baroko syllogism when the premises are true. This means that there are no rules for constructing a 1st figure syllogism out of the premises of the Bokardo and Baroko. Again, if the 1st figure syllogisms really did compose the 2nd and 3rd figure syllogisms, then we should be able to construct 1st figure syllogisms from the premises of all the valid 2nd and 3rd figure syllogisms. But we cannot. The contradictory premise used in the reduction proofs of Bokardo and Baroko is not a part of those syllogisms, and therefore cannot be thought of as composing them. Therefore, if all imperfect syllogisms reduce to 1st figure syllogisms, but some require reduction by contradiction, and reduction by contradiction uses a premise that cannot be a part of the reduced syllogism, then the reduction relation cannot be a composition relation.

How does this help us to understand the relationship between subsequent qualities and the four primary qualities? It helps by showing that “reduction” is not about resolving into minimal parts. Rather, reduction indicates a dependence upon the primary entities, whereby subsequent entities are somehow incomplete without the primary entities. In Prior Analytics, Aristotle describes this reduction as “completing” (teleiountai) the syllogisms. In fact, he refers to the 2nd and 3rd figure syllogisms as “incomplete” (ateles). Likewise the primary contraries are supposed to be “complete” (teleion). In Prior Analytics, Aristotle even gives us a definition of completeness. He writes:

(VIII) I call a deduction complete if it stands in need of nothing else (ton mēdenos allou prosdeomenon) besides the things taken in order for the necessity to be evident; I call it incomplete if it still needs (prosdeomenon) either one or several additional things which are necessary because of the terms assumed, but yet were not taken by means of premises.

This definition of “completeness,” in all its essential features, is the same as I have been using for the primary contraries, which comes from Met. X.4: “for complete difference has an end (as other things are also said to be complete in virtue of having an end) and there is nothing beyond the end. For the end is an extreme in each thing and embraces it; therefore there is nothing beyond the end nor does the complete lack anything (oude prosdeitai oudenos)” The key feature of the definition in text (VIII) for purposes of comparison is the needing of “nothing else besides the things taken” (ton mēdenos allou prosdeomenon). In the Met. X.4 passage, Aristotle gives more attention to there not being anything “beyond” the end, which is a stronger claim than the one made in APr. I.1. But it is notable that Aristotle then conjoins this necessary condition of completeness with the idea that a complete thing “lacks nothing” (oude prosdeitai oudenos). So, while the notion of completeness in Met. X.4 is a stronger notion of completeness, both definitions of completeness in APr. I.1 and Met. X.4 include the notion of “lacking nothing” as a

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123 This is clearly required by a Humphreys style generative atomism because the syntactic condition (1) requires that we be able to construct all the composed objects from the elementary entities.

124 “It is furthermore evident that all the incomplete (ἄπειραλείπτης) deductions are completed (τελειούνται) through the first figure. For they all come to a conclusion (πέραλοιμνήται) either probatively (διερχόμενος) or through an impossibility (ἄδολονται), and in both ways the first figure results (γίνεται).” (APr. 29a30-33)

125 APr. I.1 24b23-26.

126 Met. X.4 1055a12-16.
necessary condition. It is this feature of the definitions that I am going to highlight for understanding what “reduction” means.

Benjamin Morison has argued convincingly that what makes the 1st figure syllogisms “complete” is that they do not need extra premises to show their validity.\(^{127}\) It is precisely the fact that these syllogisms need no other premises for validity that makes them primitive in this system. The imperfect syllogisms, on the other hand, do need extra premises for validity, usually derived by a conversion rule. The conversion of the premise from the imperfect syllogism results in a first figure syllogism, thus showing the validity of the imperfect syllogism. However, this necessity for additional premises is not always satisfied by converting premises in a 2nd and 3rd figure syllogisms to make a 1st figure syllogism. In the cases of Bokardo and Baroko, we need a premise which is contrary to the conclusion of the syllogism in question. Then we make a Barbara syllogism with that premise that shows the contrary premise leads to an absurdity. That being said, it is clear that in all cases the imperfect syllogisms need additional premises to make it evident that the syllogism is valid. In the case of primary contraries, they need no other contraries to define their axis of contrariety: complete having and complete privation mean that there cannot be anything beyond them (i.e. no other contrariety), and so, \textit{a fortiori}, they cannot need another contrary to be complete. All of their intermediates, however, stand in need of the primary contraries to complete the definitions of their natures. The necessity of intermediates to be defined in terms of the primary contraries means that they do have contraries beyond them, and stand in need of those contraries for their being. Thus, wet and dry are complete because we need nothing but total self-determination and total lack of self-determination to understand their essences, whereas viscosity, while having some new specific difference not reducible to wet or dry, is nevertheless incomplete in definition without some reference to wetness and dryness. To “reduce” a quality, then, is not about determining the proportional amount of the extremes a particular quality has, but rather in filling out the definition of the intermediate quality in reference to one or both extremes. This may sound like a strange way to talk about reduction, but we must not let our intuitions about what “reduction” normally means in English get in the way of what Aristotle means by \textit{anagein} in Greek.\(^{128}\)

Another objection to my interpretation arises from a similarity in my interpretation with that of Alexander of Aphrodisias. Alexander understands the primary contraries to be genera, and non-primary contraries to be species.\(^{129}\) Williams objects to this view, and Krizan accepts his objection. But the worry here is misplaced. Williams’s objection is based on a rejection of a seemingly absurd result of the species/genus interpretation. If this interpretation is true, he says, and if “fine” is a species of wetness, and what makes something fine is that it can “fill things,” then the following premise must also be true: “Whatever is able to fill things is wet.”\(^{130}\) Indeed, intuitively it seems bizarre to say that wetness must belong to everything that fills something else. For instance, I can hold a handful of fine grain that easily fills a cup without perceiving the

\(^{127}\) Cf. Morison 2015, 157-164.

\(^{128}\) One might think a new translation is in order, and maybe that is so. But for our purposes here I need to use the common translation in order to refute common misconceptions.

\(^{129}\) Krizan attributes this view to Alexander. Cf. Krizan 2018b, 99. The text of Alexander’s commentary on \textit{GC} is complicated, because it was thought to be lost with only fragments remaining in the commentary of Philoponus. However, a partial Arabic translation of the commentary was discovered in an early Arabic Alchemical work. Cf. Gannagé 2005, 9-21. That particular treatment of the passage indicates that the subsequent qualities are “subsumed under” the primary qualities (Cf. Alexander, nn.14-20). This language clearly indicates a species/genus relation.

\(^{130}\) Cf. Williams 1988, 159.
grain to be wet in the intuitive sense of “wetness.” Now Williams rightly identifies why Aristotle is obliged to make this conclusion: filling something does follow from Aristotle’s definition of what it is to be wet. What this means is that Williams is proceeding (wrongly) on an ordinary English understanding of “wet.” This is the wrong approach to accepting or rejecting a given interpretation of Aristotle. For if Aristotle gives us a technical definition, and a certain interpretation helps us to see with greater clarity how his arguments validly follow from that definition, then that is a benefit of the interpretation, not a problem.

Another objection to this view is offered by Krizan. Her objection is motivated entirely by her interpretation of Aristotle’s conclusion that “all the other differences reduce to the first four, but that these admit of no further reduction.” Krizan understands this passage to mean that all non-primary contraries are reducible to all four primary contraries. She does not argue for this reading of the text but presents it as a clear commitment of Aristotle. However, the idea that all non-primary contraries are reducible to all the primary contraries, as opposed to one pair of contraries (like wet and dry) is not the correct reading of the text. While it is true that the language allows for Krizan’s interpretation, it does not require it. What Aristotle says is that non-primary contraries “reduce to the first four” (eis tas prōtas tettaras), not “all” the first four. If Aristotle had said that they reduce to “all” (pasas) four, then there would be a clear commitment, and Krizan’s worries would be well founded. However, Aristotle does not say that. It is perfectly consistent with the Greek to interpret his commitment as requiring all non-primary contraries to reduce to some of the four contraries, not all. This point is supported further in comparison with how 2nd and 3rd figure syllogisms reduce to the 1st figure. It is not the case that each 2nd and 3rd figure syllogism must reduce to all the 1st figure syllogisms. It is sufficient if they reduce to only one. On this reading, which I think is the correct one, all that one needs to satisfy the condition laid down by Aristotle is for a non-primary contrary to reduce to one pair of primary contraries. Therefore, I think that Krizan’s criticism of the genus/species interpretation, and

131 GC II.2 330a24-26.

132 “Aristotle offers a sketch of the relationship between certain non-primary tangible differentiae and the primary differentiae, suggesting that the non-primary differentiae reduce to the primary ones. In filling out this second thought, Aristotle is ultimately claiming that the non-primary qualities of bodies depend upon the primary four: each non-primary quality may be explained by reference to the primary qualities, and furthermore, a change in non-primary contraries cannot occur without a corresponding change in the primary contraries.

There is a tension in Aristotle’s account of the relation between non-primary contraries and the primary four. Although he shows that the non-primary contraries may be explained by reference to the four primary contraries, the account he offers in GC ii 2 relates non-primary contraries to only two of the four, moisture and dryness. This leads one to wonder: do non-primary contraries in fact depend upon all four primary contraries, as constituents of material bodies or could the other tangible contraries be explained by changes in moisture and dryness alone? I argue that the tension may be resolved by understanding the primary contraries as natural capacities that have distinct functional roles within natural materials. The consequence is that non-primary contraries belong to moisture and dryness as matter, but nonetheless supervene on all four primary contraries that are present in natural bodies.” (Krizan 2018b, 97) Later she writes regarding text (VII), “[Aristotle] suggests that each of the non-primary tangible differentiae—fine/coarse, viscous/brittle, and hard/soft—are from, or perhaps belong to, two of the four primary contraries. He does not, in this passage, introduce any further relationship between the non-primary tangible differentiae and the two primary contraries concerned with temperature: heat and cold. This is in tension with the conclusion of GC ii 2, as Aristotle explicitly states at 330a24-26 that the other differentiae reduce to the four primary contraries.” (Krizan 2018b, 98)

133 Williams seems to agree with my reading when he writes, “These' would naturally be taken to be hot-cold and wet-dry, but in fact all the 'reductions' which follow are to wet-dry. But if all the other differentiae can be reduced to wet-dry, a fortiori they can be reduced to wet-dry and hot-cold. So, Aristotle’s expression, though clumsy, is consistent.” (Williams 1988, 159)
likewise my interpretation of non-primary contraries as intermediates, is not properly motivated since it is based on a false reading of Aristotle’s commitments.

2.5: Primary contraries and the mechanisms of bodily change

Up to this point we have been discussing the principles of change and what those primary principles are. Now we must discuss what has been called in the literature the primitive “mechanisms” of change in Aristotle’s thought. The central text for discussions of the so-called “mechanisms for elemental transformation” is GC II.4, where Aristotle says that “we must explain what is the manner (tropon) of their reciprocal transformation.”

Understanding this text will help us to understand the mechanisms of change that will govern all change in non-living bodies.

Before we examine the text in detail, I want to point out two things. First, we must note that Aristotle, using the primary contraries of hot/cold and wet/dry, identifies what are called the four simple bodies, each of which is determined by a particular combination of primitive contraries: Earth (cold/dry), Air (hot/wet), Fire (hot/dry), and Water (cold/wet). What Aristotle is discussing in GC II.4 are the possible changes when these bodies interact. Second, we should note the following text, which reveals some key assumptions of his: “It has been established before that the coming-to-be of the simple bodies is reciprocal (ex allēlōn). At the same time, it is manifest, on the evidence of perception, that they do come-to-be.”

The second presumption in this passage is clear and straightforward, but the first is not. The reason is that what it means for the elements to be ex allēlōn (lit. “from one another”) and eis allēla (lit. “into one another”) is unclear. This might seem like a small point, but how one reads this term will determine how one reconstructs the three mechanisms of change Aristotle discusses in GC II.4. We need to have a correct understanding of these mechanisms so that we can understand how non-living bodies change and how these mechanisms differ from the mechanisms of change proper to living bodies.

In reconstructing the mechanisms in this passage, I am going to offer a very different interpretation than the majority of scholars, both ancient and modern. The principal problem with the common reconstructions is that they consider change only in terms of the qualities that must be replaced in an individual body, and not as an interaction between bodies that exchange contraries. As we will see, this failure to consider change as an interaction between bodies makes it difficult to reconstruct the mechanisms of change. Instead, I will read the mechanisms as three ways change happens between interacting bodies. This reading will not only give us a clearer understanding of the three mechanisms, but it will also highlight the importance of contraries in change and how the primary contraries of bodies restrict the kinds of change possible among non-living bodies. Getting the mechanisms of change correct here will also help us to understand the more complicated mechanisms of change found in mixtures that I will discuss in the next chapter.

134 GC II.4 331a10-11.
135 It is an open question whether these bodies can exist in their simple forms. But whether or not Aristotle thinks these bodies do have independent existence is irrelevant, because all he needs for his discussion here is an abstract taxonomy of the possible simple changes.
136 GC II.4 331a7-9.
Before turning to the text itself, let me recap what I will call the “orthodox” reading of the mechanisms of elemental change. The theory is that Aristotle presents three kinds of change in this chapter.

(1) The first kind of change is where one element changes into its consecutive element, i.e. an element with which is shares one primary quality in common.
(2) The second kind of change is where an element changes into its opposite, i.e. the only element with which it does not share a primary quality in common.
(3) The third kind of change is where two elements combine into a third different element. An example of this would be when fire and water change into air.

While I will maintain that there are, in fact, three kinds of change, nevertheless I will describe those changes differently than the orthodox interpretation.

With that in mind, let us now examine the first part of the text in question:

(VIII) (a) Thus the process of conversion (metaballein) will be quick between those which tally (echei sumbola pros allêla), but slow between those which do not.
(b) The reason (dia) is that it is easier for a single thing to change than for many. (c) Air, e.g., (hoion) will result from Fire if a single quality changes; for Fire, as we saw, is hot and dry while Air is hot and moist, so that there will be Air if the dry be overcome by the moist. (d) Again (palîn), Water will result from Air if the hot be overcome by the cold; for Air, as we saw, is hot and moist while Water is cold and moist, so that, if the hot changes, there will be Water. (e) So too, in the same manner (ton auton tropon), Earth will result from Water and Fire from Earth, since both tally with both (ampho pros amphibó sumbola). For Water is moist and cold while Earth is cold and dry—so that, if the moist be overcome, there will be Earth; and again, since Fire is dry and hot while Earth is cold and dry, Fire will result from Earth if the cold pass-away. (f) It is evident, therefore (hôste phaneron), that the coming-to-be (hê genêsis) of the simple bodies will be cyclical (kuklôi); and that this method of transformation is easiest, because the consecutive (sumbola) elements tally.138

This particular passage is commonly cited as explaining the first of the three kinds of change.139 In fact, Gill considers it so obvious that she only quotes the passage to expand upon her summary of the first mechanism. I do think that text (VIII) does talk about the first mechanism of change and explains in (b) through (e) why this mechanism is the quickest. But I also think the orthodox interpretations of the meaning of the conclusion in (f) are problematic. To see why, let us look at the orthodox interpretation.

Gill is representative of the orthodox interpretation on this point. She, and others, think that the first mechanism of change is not just the fact that adjacent simple bodies exchange their opposing contraries, but that this first mechanism is “cyclical” in character. Gill writes, “Aristotle suggests that each element can be transformed into the one adjacent to it by the first easy mechanism: air result from fire, water from air, earth from water, fire from earth. The

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138 GC II.4 331a23-331b4. This is the Oxford translation.
transformation is a cyclical sequence. Although Aristotle describes the cycle [in text (VIII)] as occurring in a single direction, he later indicates that the cycle can also occur in the other direction.”

Gill and others presume that the circularity of generation is manifested in a sequence of transformations supposedly outlined in (VIII)(c)—(e), which can be rendered in the following way: fire → air → water → earth → fire. But it is not at all obvious that this is what Aristotle intends to say. Look at how the discussion is constructed. In (b), Aristotle gives the reason why it is easier for consecutive elements to change into one another. Then (c) is given as an example of this kind of change, as is indicated by the use of hoion. At (d) we have the adverb palin introducing the next example. The use of palin does not obviously indicate that this is the next change in a sequence, only that it is another example of the same kind of change presented in (c). Again, when he presents the last two examples in (e), he begins by saying “In the same manner” (ton auton tropon), which does not obviously indicate that what follows is next in a sequence, but only that what follows is of the same kind of change as was previously discussed. Lastly, Aristotle does not conclude in (f) that there are a plurality of generations that move in a circle, he only says that the “generation” (hē genēsis) of the elements is circular. None of what I have pointed out about how text (VIII) is constructed definitively proves that the orthodox interpretation is wrong, it only points out that the orthodox interpretation of circularity is not as obvious as it might seem at first. That fact opens logical space for another interpretation. As we will see, the breaking down of the orthodox reading in the third mechanism will provide the motivation for offering another interpretation.

Before I provide my own interpretation, let us continue under the presumption that the orthodox interpretation is correct and see how that shapes the reading of the rest the chapter. Aristotle next says:

(IX) On the other hand the transformation of Fire into Water and of Air into Earth, and again of Water and Earth into Fire and Air, though possible, is more difficult because it involves the change of more qualities. For if Fire is to result from Water, both the cold and the moist must pass-away; and again, both the cold and the dry must pass-away if Air is to result from Earth. So, too, if Water and Earth are to result from Fire and Air—both must change. The second method of coming-to-be, then, takes a longer time.

This text is understood to describe the second kind of change, whereby one element changes into its opposite. We might think that it is sufficient to distinguish this change from the first because two contraries are changed, and not just one. But the orthodox interpretation goes further in order

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141 Aristotle uses it in the same way in other places. For instance, in PA II.10 656b16-19, he writes: “Εκ μὲν οὖν τῶν ὀφθαλμῶν οἱ πόροι φέρουσιν εἰς τὰς περὶ τὸν ἐγκέφαλον φλέβας πάλιν δ' ἐκ τῶν ὠσιῶτος πόρος εἰς τούπησθεν συνάπτει.” In this passage, the first part discusses pores that lead from the eyes to the vessels around the brain. Then πάλιν indicates a different set of channels, this time leading from the ears to the back of the head. Another example of this usage is found in Pol. III.11 1288a19-24: καθάπερ γὰρ ἐρήμηται πρότερον, οὐ μόνον οὔτος ἔχει κατὰ τὸ δίκαιον ὃ προφέρειν εἰώθασιν οἱ τὰς πολιτείας καθιστάντες, οἱ τέ τὰς ἀριστοκρατίας καὶ οἱ τὰς ὀλιγαρχικὰς καὶ πάλιν οἱ τὰς δημοκρατίας (πάντες γὰρ καθ’ ὑπεροχὴν ἀξιοῦσιν, ἀλλὰ ὑπεροχὴν οὐ τὴν αὐτὴν), ἀλλὰ καὶ κατὰ τὸ πρότερον λεχθέν. In this case there is a δίκαιον proffered by those founding just regimes, like a republic or an aristocracy, but also one proffered by those founding an unjust regime like a democracy or oligarchy. In this passage πάλιν is not presenting the next step in a progression, but another option.
142 GC II.4 332b4-11.
to accommodate the notion of these changes as “cyclical.” In light of this, the orthodox interpretation identifies the conclusion of this passage “the second method of coming-to-be, then, takes a longer time” as the key interpretive issue. Krizan sums up the orthodox interpretation succinctly: “If a change in two contraries takes longer than a change in one contrary, then it follows that the contraries do not change simultaneously in difficult changes. If they did, then they would not take longer than [the first kind of] changes, although they may still be more difficult.”\textsuperscript{143} So, the orthodox interpretation says that what distinguishes the second mechanism from the first is not only the fact that two qualities must change, but that they must happen in sequence in order to take a longer time.

Again, this solution seems more obvious than it is in reality. For sure, Aristotle’s requirement that a difficult change must take more time needs explanation, but the conclusion that the time is longer because there are two generations rather than one is not the only way to explain why difficult changes take longer. After all, Aristotle says that time is an enumeration of motion(s).\textsuperscript{144} But neither generation nor corruption is a motion for Aristotle.\textsuperscript{145} Therefore, the multiplication of generations is not sufficient to account for a greater amount of time, since it is a category mistake to assign a time value to a given generation rather than to the motions that come before or after the generation. Certainly it must be the case that if two consecutive generations occur, they must occur in a longer time than one individual generation. But that length of time is a result of the motions needed for the generations to happen, not a matter of the generations themselves. The extended length of time could also result when two qualities change simultaneously, because the motion(s) that accomplish the simultaneous changes take longer since there is more work required to bring about a simultaneous change. Again, this explanation is not a definitive refutation of the orthodox interpretation. My purpose here is to cast doubt upon obviousness of the orthodox interpretation, because my reasoning in this paragraph shows that the extended time required for a difficult change does not entail that there must be two sequential generations rather than two simultaneous generations.

A reason for resisting the orthodox interpretation of the second mechanism is that Aristotle lists the difficult change as a different kind of change. But the difficult change as described by the orthodox reading of the passage appears to be different from the first mechanism in number only, not in kind. After all, the only difference between the first and second mechanisms of change on the orthodox interpretation is that the second change requires two changes in sequence rather than one change. But we must ask, how is this a difference in kind? The answer: it is not.

Admittedly, my previous discussion about the first two mechanisms of change have only cast doubt upon the orthodox interpretation; they have not yet provided significant problems for that interpretation. However, the orthodox interpretation does run into some significant problems with detailing the third mechanism of elemental change. First let us see what Aristotle says, and then see where the problems lie and what solutions are commonly offered. Aristotle writes:

\begin{itemize}
  \item[(X)] (a) But if one quality in each of the two elements pass-away, the transformation, though easier, is not reciprocal (\textit{ouk eis allēla de hē metabasis}). (b) Still, from Fire and Water there will result Earth [and/or] Air (\textit{gē kai aēr}), and from Air and Earth Fire [and/or] Water (\textit{pur kai hudōr}). (c) For there will be Air, when the cold of the
\end{itemize}

\textsuperscript{144} Phys. IV.11 220a24-26.
\textsuperscript{145} Phys. V.1 225a32-225b3.
Water and the dry of the Fire have passed-away (since the hot of the latter and the moist of the former are left); whereas, when the moist of the Air and the cold of the Earth have passed-away, there will be Fire, owing to the survival of the hot of the Air and the dry of the Earth—qualities constitutive of Fire. (d) Moreover, this mode of Fire’s coming-to-be is confirmed by perception. For flame is *par excellence* Fire; but flame is burning smoke, and smoke consists of Air and Earth.  

As I noted above, the orthodox interpretation of this passage says that the third mechanism of elemental generation is that whereby two elements generate a third different element. How the proponents of the orthodox interpretation arrive at this position is complicated. The first thing to note is that such a view requires a peculiar, though not impossible, reading of (X)(b). There Aristotle describes the change as, “Still, from Fire and Water there will result Earth [and/or] Air (gē kai aēr), and from Air and Earth Fire [and/or] Water (pur kai hudōr)” I have put “[and/or]” in brackets because both have been used as the proper translation for “kai” in both places. The natural reading of this sentence is to translate the *kai* as a conjunction (i.e. “and”). Such a reading also mirrors the reading of the second mechanism in text (IX). But such a natural reading is *not* what recent translators have adopted. Instead, they translate the *kai* as “or.” The reason for coopting this translation of *kai* under the orthodox interpretation is that without such a reading the third mechanism becomes, as Gill intimates, indistinguishable from the second mechanism. This would not be the first time translators have opted for unusual readings to make sense of Aristotle’s theories. If the only problem were translating *kai* as “or” rather than “and,” I could accept the orthodox interpretation. But Williams, who opts for the “or” translation, says that even with the “or” translation the logical problem persists. He describes the problem in the following way:

Fire and water are for Aristotle characterized by pairs of qualities which we may symbolize by ‘\(AB\)’ and ‘\(AB'\) respectively. If \(A\) perishes from \(AB\) and \(B\) from \(AB',\) according to Aristotle what we get is \(AB.\) But this is surely a misleading way of describing what happens. The perishing of \(A\) from \(AB\) is nothing more than the conversion of \(AB\) into \(AB').\) Similarly, the perishing of \(B\) from \(AB\) is the conversion of \(AB\) into \(AB'.\) So whereas before we had \(AB + AB'\) what we now have is \(2AB.\) The way in which simple bodies are described as changing into each other in 331b12-26 is

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146 GC II.4 331b12-26.
147 Philoponus attributes this interpretation to Alexander of Aphrodisias. He says, “Alexander gives this comparatively simple interpretation of it, which accords with what Aristotle himself is manifestly saying, an interpretation which claims that contrary elements can produce something numerically one, when each of them changes in respect of one of their qualities, keeping the other. For earth and air sometimes produce fire, sometimes water.” (In GC, 234, 20-25) He offers a second option that is similar: “But it is possible, on the other hand, to hold that Aristotle says that one is produced from two, not numerically one, but specifically. For it is not possible that this particular quality should perish without its contrary coming to be: for example, he says, as a result of fire and water changing, air is produced, not one <quantity of air> numerically, but one <coming> from fire and another from water. For when the dryness of fire perishes, in every case wetness succeeds and air is produced; and likewise when water loses its coolness and acquires warmth, air is produced.” (In GC, 234, 234-235, 7)
148 Despite the fact that Gill ultimately rejects this reading, she does so with some hesitancy, noting that it is not the natural reading of the text. She indicates this by saying, “The phrasing is somewhat perplexing because Aristotle uses the same idiom with a different sense to describe the second mechanism.” (Gill, 71, fn.44.)
149 Cf. Joachim and Williams, *in loc.cit.*
really no different from that in which they are described as changing into each other in 331a23-b4, except that in the later passage they are taken two at a time.\footnote{Williams 1982, 163.}

As Williams points out, it is hard to see how Aristotle in text (X) could possibly believe he is proposing a \textit{distinct} mechanism, if the orthodox interpretation is to be believed. This is not a new observation, but was pointed out by Philoponus in his commentary on this passage.\footnote{Cf. Philoponus, \textit{In GC}, 234.19–235.35. It is notable that Williams is also the English translator of Philoponus’s commentary, and may have received his criticism from there. I owe this citation to Krizan 2012.} I will call this the \textit{Third Mechanism Problem} (TMP). While it is possible that Aristotle did not correctly enumerate his own mechanisms, we should, \textit{ceteris paribus}, prefer a reading wherein Aristotle does in fact manage to enumerate three kinds of change to a reading that saddles him with this sort of mistake. A correct reading of this passage, and therefore a correct reading of the basic mechanisms of change, should be able to identify three distinct mechanisms. If the orthodox interpretation falls afoul of the (TMP) and another interpretation does not, then the orthodox reading cannot be the correct reading of the text. I will show that the orthodox reading does fall afoul of the (TMP) and that my alternate reading does not.

Gill provides us with the most coherent way for the orthodox interpretation to escape the (TMP). It depends, in large part, on the translation of \textit{ouk eis allēla} in text (X). Gill argues that the usual translation of \textit{eis allēla} and \textit{ouk eis allēla} as “reciprocal” and “not reciprocal” is misleading. She rightly points out that the third mechanism differs from the first two in being \textit{ouk eis allēla}, and so “the phrase should indicate some significant divergence from the other cases. All three mechanisms involve an element that causes transformation, and that element presumably suffers a reciprocal reaction.”\footnote{Gill 1988, 71, fn. 43.} Since all three mechanisms involve an agent element that suffers a reciprocal action, she thinks that Aristotle must mean something other than reciprocity when he says that the elements change \textit{eis allēla} and \textit{ouk eis allēla}. Her solution is to read \textit{eis allēla} as “reversible” and \textit{ouk eis allēla} as “irreversible.” She writes, “If fire acts on air to produce fire, by an analogous process . . . air can act on the newly generated fire to reproduce air. . . . But if fire acts on air and earth to generate fire (a case dealt with by the third mechanism), two elements of the original sort cannot be reproduced from the fire by the original process that produced the fire.”\footnote{Krizan 2012, 9-10.}

While this solution does solve the (TMP) by providing us with a principled way the third mechanism is distinct from the first two, there are other problems lurking about. The first is an objection raised by Krizan, who argues that Gill’s reading of the orthodox interpretation of the third mechanism problematically introduces an element of chance into the interaction.\footnote{Krizan thinks that the (TMP) is still a problem for Gill, and presents Williams’s objections as part of her own criticism of Gill. Cf. Krizan 2012, 9.} She points out that when two opposite elements combine to form a different third element, it seems to be subject to chance \textit{which} element will result: “it is unclear, for example, why the interaction of fire and water would sometimes produce air and at other times produce earth.”\footnote{Krizan 2012, 9.} This objection is a problem precisely because Aristotle describes all of these changes as “natural changes” and, as we saw in my examination of the Phys. I.5 argument, chance changes are opposed to natural changes. Krizan recognizes that Gill allows for pairs of elements to regularly combine into the
same element, but that this solution raises another problem. After all, logically two opposite elements can combine into either of their consecutive elements. There is no principled reason why they should generate into one over another. In response, Krizan offers a way to resolve these difficulties, and it is a solution that I think Gill can accept. I will discuss Krizan’s solution in a moment, but before moving on I want to point out another problem with Gill’s solution to (TMP).

It is possible that Gill’s solution can resist Krizan’s chance objection, since Krizan’s objection is based on the idea that the third mechanism occurs between two bodies, whereas Gill’s example of the third mechanism involves three bodies. Notice how Gill describes the third mechanism: “Suppose that some air and earth coincide on their respective journeys toward their proper places and that their passage is jointly obstructed by a large body of water. This is the sort of situation handled by the third mechanism. The air and earth are likely both to be changed into water.”\(^{156}\) It seems that what is unique about the third mechanism on Gill’s account is that when two elements interact with a third distinct element of greater size, the first two elements become the third. This transformation appears to rely on the greater size of the third element.\(^{157}\) If true, then this way of constructing the third mechanism is not subject to chance in the way that Krizan’s objection intimates. But this reading of the third mechanism leads to a new objection: what if the combined amounts of earth and air are greater than the body of water with which they mutually come into contact? In that case, it would seem that the water should become earth and air, thus reversing the process. That would be a problem for Gill, since such a possibility undermines a fundamental aspect of her reading, namely that the third kind of change is \textit{ouk eis allēla} in the sense of being irreversibility. Gill uses irreversibility to distinguish the third mechanism of change from the first and second, and so without irreversibility her reading falls prey to the (TMP). To solve the chance objection, she has to give up the irreversibility of the change. To keep the irreversibility of the change, she must accept some amount of chance into the natural change. This dilemma is a significant problem for Gill’s version of the orthodox reading.

Krizan takes a different approach to solving the (TMP). She maintains the common translation of \textit{ouk eis allēla} as “non-reciprocal,” and calls the third mechanism of change a “non-reciprocal” change. However, even though her descriptions of the first two mechanisms are similar to the orthodox interpretation, she does not refer to them as “reciprocal changes.” Instead, she emphasizes the first two mechanisms in terms of the cycle of changes. She accepts the orthodox reading’s presumption that text (VIII) is presenting a cycle of changes, but she adds that the first mechanism of change is unidirectional, i.e. in the paradigm cases elements only generate in one direction. The difference between the first and second mechanisms is the same as the orthodox reading, i.e. the second mechanism requires a body to go through two generations whereas the first only requires one.\(^{158}\) That being the case, the third mechanism, what she calls “non-reciprocal” changes, is engaged in situations where two elements stand in relation to one another as agent to patient. By introducing one element as the agent of change Krizan thinks she can offer a unique story for what the third mechanism adds to the cycle of change, namely that such an agent/patient relationship permits changes to go in the \textit{opposite} direction from what the paradigm cycle requires. So, if water acts on fire, fire will not become air, as the paradigm cycle

\(^{156}\) Gill 1988, 73.

\(^{157}\) Gill’s language of how elements “attack” one another and how powers are “overcome” certainly supports the notion that the bigger element will triumph.

would require, but can become earth instead.\textsuperscript{159} She writes, “In effect, non-reciprocal change is an explanation of counter-cyclical changes.”\textsuperscript{160}

This interpretation requires the agent/patient relationship between elements to be unique to the third mechanism. However, making an agent/patient relationship the feature that differentiates the third mechanism from the first two has the unintended consequence of causing problems with how we are to understand the first two kinds of elemental change. Why? Precisely because the paradigm cycle of change is unidirectional. This uniform directionality in change means that when two bodies interact, only one body changes. For example, look at a change along the lines of the first mechanism. When fire and air interact, only fire will change (e.g. into air). Why? Because if air changed, it could only change into fire, since fire cannot make air into water (for fire is neither cold nor wet). But if air changed into fire, it would be changing in the opposite direction to that of the paradigmatic cycle of changes. Therefore, the two bodies cannot change into one another in the first two mechanisms of change. But if only one body changes in these mechanisms, why is it not the case that the unchanging body is the agent while the changing body is the patient? This situation is exactly the sort of relation that Krizan is restricting to the third mechanism. We might think that this problem can be avoided by describing the first two mechanisms of change without requiring two bodies to interact. In that case, the paradigm cyclical change just describes when one body loses a quality and gains another. But then there is an element of chance introduced into the change, because there appears to be nothing that determines when a body changes into the next one. For if change happens without an interaction with another body, there is no cause of that generation and corruption. So, that cannot be the solution to the problem, because Krizan is trying to provide us with mechanisms that do not involve chance. There are other paradoxes that can be observed if we were to do an analysis of the second mechanism, but I think the problems with this first mechanism are sufficient to show the larger problems Krizan’s interpretation has. While Krizan has provided a plausible solution for understanding the third mechanism, she has created multiple problems for understanding the first two mechanisms.

With those criticisms in mind, I now want to propose my own reading of the text. To begin, I want to remind us of the context of the passage we have been discussing. At the beginning of \textit{GC} II.4, Aristotle presents two questions that he will answer in the chapter: (1) Can every element be generated from every other element? And (2) what is the manner of their change into one another (\textit{eis allēla})\textsuperscript{161} Aristotle proceeds to say that the answer to (1) is evident: obviously each of the elements can be generated from each of the others. He does so on the basis of his theory of how contraries work in natural change. Since each element is contrary to each other element in terms of at least one quality, Aristotle thinks that, “It is evident (\textit{phaneron}), therefore, if we consider them in general, that every one is by nature (\textit{pephuken}) such as to come-to-be out of every one.”\textsuperscript{162} What Aristotle is doing in the rest of the passage, namely the portions we have been examining, is discerning how the elements transform \textit{eis allēla} or \textit{ouk eis allēla}, which I translate more literally as “into one another” and “not into one another.”

As I mentioned earlier, I think that the choice of translation is important in establishing the shape and meaning of the argument. By translating \textit{eis allēla} as “into one another” I am indicating that Aristotle is not only presuming that two bodies are involved in every elemental

\textsuperscript{159} Cf. Krizan 2012, 10-11.
\textsuperscript{160} Krizan 2012, 12.
\textsuperscript{161} \textit{GC} II.4 331a10-12.
\textsuperscript{162} \textit{GC} II.4 331a20-21.
change, but that there are, in fact, two simultaneous changes going on, where each body is generated into the kind of body it is interacting with. For example, let us say that A is water and B is air. When they interact and change, they exchange contraries (in this case hot and cold), and at the completion of the change A becomes air and B becomes water. And so in the process of change, A and B change “into one another,” that is, each becomes at the end of the change what the other was at the beginning of the change. Aristotle then distinguishes two kinds of this change eis allēla, i.e. one where the two bodies exchange only one contrary (in text (VIII)) and another where they exchange both (in text (IX)). The latter is said by Aristotle to be “more difficult” and to take “more time.” As I noted earlier, what he means when he says this latter change “takes more time” is mysterious, and the orthodox answer is only probable at best and so I will not enter into a long discussion of what Aristotle means by adding a temporal dimension to the second change.

Instead, I just need to note that what characterizes this change eis allēla is that the bodies involved in the change become what the other body is. I consider the latter reading of the text to explain the first two mechanisms that Aristotle describes in texts (VIII) and (IX).

One obvious advantage of my reading is that it allows for a more intuitive reading of text (X)(b): “Still, from Fire and Water there will result Earth [and/or] Air (gē kai aēr), and from Air and Earth Fire [and/or] Water (pur kai hudōr).” As I noted earlier, the common interpretation requires that we read the kai in the result side of the examples as “or” rather than “and.” Although it is possible to do so, it seems out of place because it disrupts the chiastic structure of the sentence. My reading allows us to translate the kai as “and” because the interaction between two opposites, say fire and water, will result in two new bodies, in this case air and earth.

Another advantage that my reading of this passage offers is that it avoids the (TMP) altogether, which claims that change ouk eis allēla is superfluous. As my criticisms of Gill and Krizan have shown, if one considers change eis allēla in terms of the orthodox interpretation, it becomes difficult to explain how the third mechanism differs from the first two. But my interpretation of eis allēla requires that we consider the result of the interaction of two bodies, not just the qualities of a body that must change for a new simple body to result. On my view, the reason why changes eis allēla can be considered “generation” is because in the interaction each body causes the other to become like itself. So, when a body A (water) and a body B (air) interact, A causes B to become water and B causes A to become air. But in a change ouk eis allēla, the two bodies do not generate new bodies like themselves. Instead the interaction results in two new simple bodies that did not exist before. So, when A (water), and C (fire), interact, they “corrupt” precisely because the end results are two new kinds of simple bodies, namely A (earth) and C (air). So, calling this kind of change corruption and distinguishing it from

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163 The orthodox reading can allow for changes of the simple bodies as “into one another,” as Krizan’s reading of eis allēla as “reciprocal” intimates. The difference is that I take the change of the bodies into one another as central for distinguishing the third mechanism from the first two, whereas the orthodox interpretation does not need reciprocal interaction between bodies in order to distinguish the three mechanisms.

164 My answer here might seem like a dodge, and it is. Why is my reading better than the orthodox reading on this account? Because the orthodox reading needs to explain why the second mechanism takes more time than the first in order to distinguish the first and the second mechanisms. The problem of the orthodox reading is not that it cannot explain why the second mechanism takes longer. The problem is that it needs the explanation of the extended time to explain why the second mechanism is different from the first. My reading does not need that solution. Rather it distinguishes the two mechanisms in a way that does not require an explanation for why the second mechanism takes longer. There could be many reasons, but that is a side issue that does not add anything to our discussion of why the second mechanism differs from the first. Therefore, I feel free to dodge.
generation is not at all superfluous but identifies a real difference between the kinds of change, i.e. in the results of the change.

A third advantage is that my reading resolves the problem that the orthodox interpretation has regarding the element of chance involved in the third mechanism. Since my reading entails that two new bodies are generated, the worries about chance in these exchanges largely disappear. However, the worry would still exist to some degree in that it is unclear which body corrupts into what new kind of body. For example, take A (water) and C (fire). It seems that there is no reason why A should become either air or earth. It may be the case that Aristotle does accept some amount of chance events in these types of change, even if they are “natural” in all other respects.165 There is, though, one possibility for a consistent natural result based upon the definitions of the four primary qualities. While it is true that hot and dry are both “having” qualities, we could nevertheless consider cold to be the active quality in an exchange between fire and water, since hot only joins things that are like whereas cold joins together both unlike and like things. Therefore, we can see water as the primary cause of the interaction here, and so when fire and water interact they interact primarily along the hot/cold contrariety. If so, then water always becomes air in this exchange and fire always becomes earth. And thus the problem of chance being involved in the natural change of the elements is neutralized.

Putting all this together, both the linguistic evidence and the way in which it makes sense of Aristotle’s argument, I think that my reading and interpretation of the three mechanisms of elemental transformation is the correct one. In summary of what I have discussed so far, we can understand Aristotle’s three mechanisms of change to be as follows: (G1) generation between two consecutive simple bodies that exchange one pair of contraries; (G2) generation between two contrary simple bodies that exchange both contraries; and (C) corruption between two contrary simple bodies that exchange only one pair of contraries. I label the first two as (G1) and (G2) because Aristotle describes both as a type of generation. The kind of transformation discussed in text (X) is called by Aristotle a kind of corruption in (X)(a), and thus why I label it (C). In the rest of this dissertation I will be using these three mechanisms of change as the most fundamental kinds of change, attributable to the elements and their mixtures.

2.6: Conclusions regarding the mechanisms of basic bodily change

Now it is time to summarize what we have learned in this chapter. First, we have seen that the primary contraries of all bodily change are hot/cold and wet/dry. We have noted how these qualities are complete for all bodies and why intermediates require some proportion of at least one pair of contraries as part of their essences. Second, we have seen what the basic mechanisms of change are. In terms of simple bodies, change is the result of an exchange of contrary properties between bodies. When the bodies generate into one another, they either exchange one pair of contraries (G1), as in the case of consecutive simple bodies, or both pairs of contraries (G2), as in the case of contrary simple bodies. When the bodies corrupt into different simple bodies, such a change is only possible between contrary bodies where they exchange only one pair of contraries (C).

The mechanisms of change we have discussed in this chapter are very simple, and probably too simple to explain all the changes between non-living bodies. There are questions relating to mixtures of simple bodies: how to they come about and in what way is the process of

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165 Certainly Philoponus sees no particular problem with some chance being involved, since he does not address the problem in any amount of detail. Cf. in loc. cit.
change between mixtures different than that of the simple bodies? These are important questions, and they are questions we will examine in detail in the next chapter. In the process of that examination we will also have the opportunity to examine the difference between changes that involve non-living bodies and those that involve living bodies. After all, both living and non-living bodies are composed of mixtures. A clearer understanding of how changes between mixed bodies are dependent on the changes of simple bodies will help us to see how the changes in the most basic kind of living bodies differ from non-living bodies in general.
Chapter 3: Change in Non-Living Bodies and Living Bodies

“Yet grasping anything trustworthy concerning the soul is completely and in every way among the most difficult of affairs.” (*De anima* I.1 402a10-11)
3.1: Introduction

In chapter one, we examined Aristotle’s basic notion of natural change and the importance of contraries. In chapter two we examined the mechanisms of change in simple bodies and discovered that bodily change is fundamentally an exchange of qualities. The exchange of qualities happens between contraries and Aristotle identifies two pairs of contraries that are basic for all bodily change, namely the hot/cold contrariety and the dry/wet contrariety. Between each pair of contraries are an abundance of intermediates, each of which has a defining property that includes in its essence a partial privation of both extremes. It is because these intermediates are essentially a proportion of each extreme that they are reducible to the primary qualities.

The abundance of intermediates between the four basic contraries gives Aristotle the tools to explain why the observable world is made up of more than just four types of body. In fact, Aristotle is able to use the mechanics of change in the simple bodies to explain, with a surprising level of sophistication, observable changes between all non-living bodies. One goal of this chapter is to understand better how these mechanisms work in mixed bodies. To that end, I will examine how these mechanisms of change can explain the observable changes in mixed bodies that Aristotle discusses in other works. Then, once I have done that, I will identify why the basic mechanisms of non-living bodies cannot explain changes in living bodies. The discovery of the reason why the most basic of soul faculties, i.e. the vegetative powers, cannot be reduced to the three mechanisms of change discussed in the last chapter will help us to see why living bodies are different in kind. I will also identify the contraries that govern vegetative exchanges. What we will see is that whereas changes in non-living bodies are determined by their elemental profiles, changes in living bodies are not. That would make changes in living bodies distinct in kind from non-living bodies, since all the changes we have examined so far are completely determined by changes in the elemental profile. What makes change in living bodies distinct is that they have the ability to take on the matter of other bodies without losing their forms. To get there, we must begin our examination with a closer look at how the mechanisms of bodily change work in mixed bodies.

3.2: Mechanisms of change and mixtures

As we saw in the previous chapter, there are three basic types of bodily change: (G1) generation between two simple bodies that tally with one another and exchange one pair of contraries; (G2) generation between two contrary simple bodies that exchange both contraries; and (C) corruption between two contrary simple bodies that exchange only one pair of contraries. The common characteristic to highlight about all three of these changes is that they involve an exchange of contraries. It is this characteristic of exchange that I think typifies the basic change common to all bodies, both living and non-living.

This description of bodily change is nevertheless incomplete. The above mentioned mechanisms of change come from an examination of the simple bodies, but it appears that Aristotle thinks all sublunary bodies are mixtures. As Aristotle says, the things we call earth, air, fire, and water, are really mixtures with a predominance of the particular element with which it shares a name.166 On their own the three simple mechanisms of change only consider change...
between the extreme qualities, and do not, yet, show how change happens with respect to intermediates. So, more explanation is needed. For our purposes, I think it is important to see the simple bodies and their mechanisms of change as principles of mixed bodies and of change. Aristotle himself says as much in *GC* II.1 when he writes, “Thus as principles we have firstly that which is potentially perceptible body, secondly the contrarieties (I mean, e.g., heat and cold), and thirdly Fire, Water, and the like.” In *Phys*. I.5-7 he explained why the first two are principles. That which is “potentially perceptible body” is the substratum required by Aristotle’s argument in *Phys*. I.6. The contraries are required by the argument in *Phys*. I.5 which we examined in chapter one. But it is only in *GC* that he shows how the third group, i.e. the simple bodies, are additional principles for explaining the changes in mixtures. What distinct explanatory power do the simple bodies have that the basic contraries do not have?

The answer is that the simple bodies are the elements of bodily change. According to Aristotle, an element is “the primary component immanent in a thing, and indivisible in kind into other kinds.” What this definition means is that if you divide an elemental body, the division cannot result in bodies of different kinds, but in two bodies of the same kind. In other words, if you were to have an elemental body, no matter how many times you divide it, the bodies that will result will always be of the same kind as the body before you divided it. The requirements of this definition also indicate that the elements in any genus must be of the same genus, and so Aristotle says that “the elements of perceptible things are bodies.” It does not contradict the definition to say that we can discern two qualities in a given element, because this discernment is not a division into something of the same genus (i.e. a body). Rather, it is an observation of distinct properties that cannot exist on their own because they belong to a category other than substance (i.e. the category of quality). Therefore, the elements of bodies must themselves be bodies, not properties of body like the qualities that are the principle of change. That these elements have explanatory power that the qualities do not is evident in Aristotle’s insistence in multiple places that the contraries do not change into one another, but that the simple bodies change into one another. (G1), (G2), and (C) do not have the qualities change into one another. Rather, the qualities are exchanged. So, the qualities do not change into one another so much as

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bodies in the sub-lunar realm contain all 4 elements, or at the very least all 4 contraries. Cf. *Meteo*. I 340b21-26; II.4 359b32-33; IV.4 381b23-28; IV.8 384b24-33. There are also a number of places in *GC* where Aristotle indicates that all bodies in the sublunary world are mixtures. Cf. *GC* II.3 330b21-30.

167 *GC* II.1 329a32-35.

168 *Met*. V.3 1014a26-27.

169 This is the common understanding of the first definition of “element” through the ages. Alexander of Aphrodisias gives it as the more probable of two possible readings: “If the first reading [is accepted], its meaning is easily understood; for the element cannot be divided into other and different kinds.” (Alexander *In Met*. 354, 33-34) Thomas Aquinas gives a similar reading in his commentary: “But those bodies which are called elements are not divisible into other bodies which are specifically different, but into like parts, as any part of water is water.” Thomas Aquinas *In Met*. V lect. 4, n.800. Kirwan also affirms this interpretation, albeit in an indirect fashion: “The elements of modern chemistry were originally so called in the same sense, but are now known, of course, to ‘divide further into other things differing in form’: e.g. not all parts of oxygen are oxygen.” (Kirwan 2003, 128)

170 Cf. *Phys*. IV.1 209a17. Cf. Crowley 2013, 163: “The foregoing quotation from the *Physics* can be read as a specific instance of a general rule that the principles or elements of any class of things should be the same in kind as the things of which they are the principles (see *Cael*. 3.7, 306a9-11).” Also, cf. Solmsen 1960, 259-60.

171 This is the point of his example in *Met*. V.3 of how letters compose words. Letters do indeed compose words, but when we divide words into letters we are not dividing words into elements of the same kind as the word.

172 *PACE* Sokolowski and Frede, who say that the primary qualities are the elements. Cf. Sokolowski 1970, 263-88; Frede 2004, 303.

173 Cf. *GC* I.6 322b15-17; I.7 324b15-27; II.1 329a35-b3; II.4.
change places with one another. But the bodies, of which the qualities are predicated, do change into one another, and this is especially true in (G1) and (G2). Therefore, because the bodies, and not the qualities, are what change into one another, the simple bodies are the proper elements of bodily change.

As I noted above, Aristotle seemingly does not think that the elements have their own separate existence.\textsuperscript{174} But if the elements do not have their own separate existence apart from mixtures, how can they be said to exist in a mixture in a way that is meaningfully different from the way that the primary qualities exist in a mixture? How do they compose or mix to form a particular body in a way that is different from how the four primary qualities compose and mix? This is where Aristotle’s notion of “potential existence” becomes important. Aristotle says that:

\begin{enumerate}
  \item [(I)] The compound may \textit{be actually}, other than the constituents from which it has resulted; nevertheless each of them may still \textit{be potentially} what it was before they were combined, and both of them may survive undestroyed. (For this was the difficulty that emerged in the previous argument; and it is evident that the combining constituents not only coalesce, having formerly existed in separation, but also can again be separated out from the compound.) The constituents, therefore, neither \textit{persist actually} (\textit{oute diamenousin oun energēiai}), as body and white persist; nor are they \textit{destroyed} (either one of them or both), for their potentiality (\textit{hē dunamis autôn}) is preserved.\textsuperscript{175}
\end{enumerate}

It is worthwhile to spend some time dissecting the meaning of this much discussed passage, because the notion of potential presence will help us to understand the mechanisms of change in mixed bodies. Such an understanding will also help us to see how the mechanisms of change in mixtures are reducible to the mechanisms of change in the simple bodies, whereas the mechanisms of change proper to living things are not.

\subsection*{3.2.1: Potential presence}

From text (I) above, we can see that the notable features of potential presence are that (1) the elements are not destroyed (\textit{apolōla}), (2) the elements are not actual, but potential, and (3) the elements can reemerge from the compound. Let’s look at (1) and (3), since understanding these features will help us to understand what Aristotle means by “potential” presence. First let us see what potential presence is not. As we discussed, the mechanisms of change, (G1), (G2), and (C) all occur by means of the exchange of contraries. We may see this exchange as an exchange of forms, as opposed to an exchange of material. Aristotle’s example of actually persisting objects seems to confirm this interpretation of change, for he says that potential persistence is not like how “body and white persist.” Presumably, this kind of actual persistence is like the persistence of a property in a complex change. So, when the “small body” becomes a “large body,” the actual property “body” persists through the change. Likewise, when “white Socrates” corrupts into a “white corpse” the actual whiteness persists. This type of persistence would be \textit{actual} persistence, because the \textit{actual} form stays the same through the change. Potential persistence must be something different.

\textsuperscript{174} Cf. \textit{Meteo}. I.340b21-26; II.4 359b32-33; IV.4 381b23-28; IV.8 384b24-33; \textit{GC} II.3 330b21-30.
\textsuperscript{175} \textit{GC} I.10 327b24-31. The italics are mine.
To grasp what potential presence is, it is important to understand what potential existence is for Aristotle. We must understand this because, as we will see in section 3.3, the simple bodies exist only in potency. Though not actual, potential presence is real because things that are potentially present have a real effect.\(^{176}\) What this means is that bodies with potential existence have real existence. I mean by “real existence” that potential things “exist” according to a proper, not metaphorical or homonymous, meaning of that term. The reality of potential presence makes it distinct from mere possibility because to say that something is merely “possible” implies that it does not exist. Aristotle famously says that “being is said in many ways,” and these meanings have a pros hen analogous relation to one another.\(^ {177}\) While the variety of meanings are related to one another, nevertheless “to be actually” and “to be potentially” are distinct and different ways “to be.” Understanding the difference between being-actually and being-potentially is notoriously difficult. I think that the easiest way to understand the distinction in Aristotle’s thought is to consider a clear example of a potentially existing being. Fortunately for us, Aristotle discusses such an entity that has real existence, but whose real existence is only in potency and not in actuality. That entity is the “infinite.” If we can review how the infinite exists in potency, we will be in a better position to understand how the elements exist in potency in a mixture. What we will see is that the potential existence of the infinite is related to how events actually exist. When we consider the existence of actual events, then we will be able to understand how the infinite potentially exists. Then, having considered how the infinite potentially exists in the manner of an event, we will be able to understand how the elements potentially exist in bodies. The arguments we will be examining will help us to see that potential existence is a primitive feature of Aristotle’s system. We will also see that potential existence is dependent upon actual existence, while nevertheless placing real restrictions on actual existence. That fact is a result of the natural association between potency and act by means of axes of contrariety.

To begin our examination, we turn to the infinite. Aristotle discusses the existence of the infinite in Physics III.4-8, where he shows that the infinite exists as the ability to become in a certain way rather than as actually being in that way. He begins the examination of the infinite in Phys. III.5 with several arguments for why the infinite cannot exist actually. Then he argues that even though the infinite does not actually exist, it is impossible for the infinite not to exist in some way.\(^ {178}\) Since things can exist either in actuality or in potentiality, and the infinite must exist but cannot exist actually, then the infinite must exist potentially.\(^ {179}\) Aristotle then proceeds to explicitly warn his readers what he does not mean when he says that the infinite exists in potency. He writes:

\[\text{(II) } (a) \text{ But we must not construe potential existence (to dunamei on) in the way we do when we say that it is possible for this to be a statue (ei dunaton tout’ andrianta einai)—[as this will be a statue, so the infinite will be in actuality]. (b) Being is spoken of in many ways, and we say that the infinite is in the sense in which we say it}\]

\(^{176}\) My use of “real” is not tracking any particular language in Aristotle, but does pick out something that he does consider. Aristotle himself has difficulty articulating what this means, but we see him attempt to articulate it in Phys. III.6 206b12-16, where he first says that the infinite exists in no other way (ἄλλως οὐκ ἔστιν) but potency and then says that this is a way of existing “actually.” I will speak to this directly in a few lines. For now, just note that I am trying to identify by the label “real” something that I think Aristotle does hold, but does not articulate clearly.

\(^{177}\) Cf. Met. IV.2 1003a33-b6.


is day or it is the games, because one thing after another is always coming into existence. (c) For of these things too the distinction between potential and actual existence holds. We say that there are Olympic Games, both in the sense that they may occur (tōi dunasthai gignesthai) and that they are actually occurring (tōi gignesthai).  

This is a dense passage, denser than we might think at first glance. The first thing to recognize is that in text (II)(a)—(b), Aristotle begins to describe how the infinite can exist potentially by first distinguishing between two ways something can exist actually. Something can actually exist in the manner of a statue and in the manner of “the games.” In contemporary terms, we are able to distinguish these two ways of actually existing as the way that objects exist versus the way that events exist. Why does he begin the discussion of how the infinite has potential existence by talking about actually existing things? Presumably Aristotle does this because actual existence is prior to potential existence, which means that the ways a thing can be actually determines the ways a thing can be potentially. So, if there is a relevant distinction among the ways that a thing can exist actually, then there will be a similar distinction among things that exist potentially. Aristotle affirms this in text (II)(c), when he says that the Olympics have both actual and potential existence. Simplicius gives some helpful commentary on this point:

For since the potential is spoken of in relation to the actual, the potential will be spoken of in as many ways as the actual. There are two ways of being in actuality; for it is either what exists as a whole as what it is, like a man or a house, or as what has its being in becoming, like a contest and a day. For we say that these also exist in actuality when they exist. So therefore there are two ways of being potential, the one in relation to what exists whole all at once, as we say that the bronze is potentially a statue, because it sometimes emerges into being a statue, which exists whole complete, the other in relation to what has its being in becoming.

It appears, then, that each type of actuality has a type of potentiality associated with it. Now Aristotle says that the way the infinite potentially exists is like how a day or “the games” exist, i.e. as an event. So, before we try to understand how the infinite exists, let us first examine the ways that games exist actually and potentially.

One of the curious things about events is that they do not actually exist all at once. As Aristotle and Simplicius say, events like “the Games” are mixtures of actuality and potentiality: “Now [Aristotle] says that these exist in actuality as well, not as things which are present all at once, but as those whose being is in becoming and are present by part, in the way that a contest and a day exist. For these also have their potentiality mixed (summemigmenon) with
actuality.”

What does this mean? Well consider something like the Olympic Games (ancient or modern, take your pick). Not all of a particular Olympic Games actually exists at once. Even if all the events were able to be played simultaneously on the same day, when the games are actually happening there are always parts of individual events that have not yet come to be but will be. So an Olympics, where the games are actually happening, always has potential parts. What does this distinction tell us about the infinite? Well, text (II) tells us that the infinite exists in the manner that the Olympics exist, and because the infinite only exists potentially, then it exists in the way the potential parts of the Olympics exist. What is this manner of existence? In text (II)(c), Aristotle says that the Olympics exist actually in the sense of becoming (tōi gignesthai) and potentially in the sense of the ability to become (tōi dunasthai gignesthai). I understand this “becoming” to be opposed to “being” (ousia) in the sense of substance.

Therefore, the infinite exists in the sense of the ability to become, rather than in the sense of actually becoming.

To learn more about this manner of potential existence, let us consider how the potential existence of the infinite is related to the essence. In his discussion of the infinite, Aristotle insists that the infinite is not accidental to the actual thing in which it inheres. For instance, he says that the infinite is a “certain essential (kath’hauto) receptivity” of magnitude and number. This makes sense of the necessary potential parts of an event, for the potential parts of an actual event are necessary precisely because they are essential principles to the actuality of the event’s becoming. Therefore, Aristotle holds that the infinite is essential to the thing in which it inheres in the way that the potential parts of an actual event are essential to that event. Therefore, the infinite is an essential part.

But what does this identification of potency as an essential part tell us? On the one hand, it gives us a reason to think that potential existence is a basic feature of Aristotle’s thought. For if the essence has potential parts as well as actual parts, then the essence of a thing is incomplete without its potential parts. On the other hand, it also means that the essential potential parts are definable, since essences are definable. Aristotle, in fact, gives a definition for the infinite: “something is infinite if, taking quantity by quantity, we can always take something outside.”

Without needing to consider the particularities of this definition, we can say that, as a definable part of the essence, essential potencies cannot be just any possibility, but are a restricted set of possibilities with a necessary and natural relation to the essence of an actual object or event. This

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183 Simplicius In Phys. 497.14-17.
184 Cf. Met. V.1 1013a17-19, which I will discuss below.
185 ἐτι πῶς ἐνδέχεται εἶναι τι αὐτό ἄπειρον, ἐπερ μὴ καὶ ἀριθμὸν καὶ μέγεθος, ὦν ἐστι καθ’ αὑτό. (Phys. III.5 204a17-19). Also: κατὰ συμβεβηκὸς ἄρα ὑπάρχει τὸ ἄπειρον. ἄλλ’ εἰ οὕτως, ἐφηστε ὅτι οὐκ ἐνδέχεται αὐτὸ λέγειν ἄργην, ἀλλ’ ὅ δε συμβεβηκε, τὸν ἀέρα ἢ τὸ ἀρτίον. (Phys. III.5 204a29-31)
186 Phys. III.4 203a1-4.
187 For our purposes, I take “essential part” to be inclusive of ἵδια, since, as we will see, the importance of picking out the relation of potency to the essence is the necessary connection between a particular actuality with a particular set of potencies. Whether these potencies just are part of the definition of the essence or ἵδια that flow from the essence does not matter.
188 The essence would necessarily be incomplete without the ἵδια, since the ἵδια flow directly from the essence itself as a natural result.
189 ἄπειρον μὲν οὖν ἐστιν ὦ κατὰ τὸ ποσὸν λαμβάνοντον αἰτί τι λαμβάνειν ἐστιν ἔξω. (Phys. III.6 207a7-8) It is admittedly oxymoronic to say in Greek that the infinite (ἄπειρον) has a definition, because a definition implies finitude (πέρας). But Aristotle does properly define it, so we must accept the oxymoron.
natural relation of the possibilities of an event or an object has a real effect in that certain effects
are impossible without the preexistence of a real potency in the essence of a thing or event.

This discussion about the infinite as existing potentially may still be unclear. To see how
essential potencies differ from mere possibility I suggest that we consider Aristotle’s example of
the Olympic Games in greater detail to see what further understanding of potential existence we
can extrapolate from it. The games are actually becoming and potentially becoming when the
Olympic Games actually exists. But the Olympic Games consists of a definite list of events,
among which are running, swimming, archery, etc. When these events are occurring they are
actual, and when they have not yet occurred, they are potential. When at least one event is actual,
then the Olympic Games are actually existing. Now consider a thought experiment where the
Olympics have not yet begun, but the national teams have gathered. What if members of
different national teams decide to compete in an event that is not one of the official Olympic
events? For example, say that members of the US national delegation and the German national
deglegation decide to play a competitive game of horseshoes before the first event of the official
Olympics is scheduled to begin. Despite the fact that all the participants in the game of
horseshoes are proper participants in the Olympic Games, and despite the fact that the game of
horseshoes is a competition between national teams, because the event, “Horseshoes,” is not a
potential part of the Olympic Games, the playing of horseshoes between the German and US
national teams does not make the Olympic Games to be actual. To put it another way, the failure
of the game of horseshoes to be a potential part of the Olympic Games means that playing the
game of horseshoes does not make the Olympic Games to actually exist. Only when the real
potential events of the Olympics come into actual existence can we then say that the Olympics
actually exist. What this thought experiment shows us is that even though potential parts of an
essence do not actually exist, they do have a real effect, for these real potencies determine which
actualities make something or some event really exist.

What the examination of the infinite and events in general tells us is that actual events
have essential potential parts, and that these parts are definable and therefore can exclude certain
possibilities from being part of the events themselves. Now, going back to text (II)(a), Aristotle
considers the potency of objects to be more obvious than the potency of events, and so he uses
the real potency of a statue to help us to understand the potency of the infinite. Therefore, it
seems clear that for Aristotle objects can and must have essential potential parts too.

What are these potential parts of objects? Remember that Aristotle insists that the infinite
is a principle, and that it is a potency like the potential parts of an event, which Aristotle
describes in text (II)(c) as possible to become (tōi dunasthai gignesthai). Now, consider that in
Met. V.1, when Aristotle is summarizing the kinds of principles, he says that we can reduce the
kinds of principles to three: “It is common, then, to all [principles] to be the first point from
which a thing either is (estin) or comes to be (gignetai) or is known (gignōsketai).”\(^\text{190}\) It seems
reasonable to think that this distinction between principles is at work in the Physics passage we
are considering. So, if the principle that is an essential potency of an event concerns how the
event can become, then it seems that the principle that is the essential potency of an object is
what other objects can be.\(^\text{191}\) For example, this block of marble can be a statue but cannot be
cereal. The essential potencies of objects, then, pertain to what objects can be actually in their

\(^{190}\) πασῶν μὲν οὖν κοινὸν τῶν ἀρχῶν τὸ πρῶτον εἶναι ὢθεν ἢ ἔστιν ἢ γίγνεται ἢ γιγνώσκεται· (Met. V.1
1013a17-19)

\(^{191}\) Objects can have principles for how we can know them, but events can have such principles also. So, the
principles of knowledge do not seem to distinguish potencies of objects from potencies of events.
essences. Let us call these real potential ways of existing potential properties. I should note that not all potential properties need be essential properties. I have focused on essential potential properties in order to show that they are really distinct from actual properties while still being necessary parts of actually existing entities. Acknowledging that there are basic properties of an essence that are not actual properties and that we call these properties “potential properties,” we can now begin to understand how the elements can exist in a mixture potentially.

If we take these lessons about real potential existence and return to GC, we see that Aristotle plainly states that bodies have both actual and potential properties. Look at what he says about the primary qualities:

(III) (a) Moreover contraries also suffer action, in accordance with the definition established in the early part of this work. For the actually hot is potentially cold and the actually cold potentially hot; so that hot and cold, unless they are equally balanced, are transformed into one another. . . . (b) It is thus, then, that in the first place the elements are transformed; and that out of the elements there come-to-be flesh and bones and the like—the hot becoming cold and the cold becoming hot when they have been brought to the mean. For at the mean is neither hot nor cold.  

Text (III)(a) tells us that just knowing the facts about what the qualities are actually does not gives us all the facts about the qualities. Rather, there are another set of facts, namely how the qualities exist potentially. But these potential facts are facts about what external objects can cause the body to change. So, these potential facts are dependent upon the actual facts, such that the potencies do not exist without the actualities. When something is actually hot it is also potentially cold, which means that only something cold can cause change in the actually hot body, not something hot. The facts about the actual existence of a property in a subject give us the essence of what it is, but the facts about the potential existence of a property in a subject give us the possibilities for what it can be.

Now, since we are considering natural properties, there must be some natural relation between what an object actually is and what it potentially is. What is the relation between the potential properties and the actual properties? The connection between the actual and potential properties comes from an axis of contrariety. When something is actually hot, it has the potential to change such that it becomes cold, since hot is on the hot/cold contrariety axis. Now if something is hot in the extreme, we know that such a body only has a potential to be cold, since from the extreme of hot all the potential parts of the axis are only in the direction of cold. In addition, because “dry” is on a different axis of contrariety from “hot,” being hot tells us nothing about the body’s potency to become dry. We can discover the potency for dryness when we discover that the body is actually wet, since there is a contrariety axis between wet and dry. We know that something that is wet in the extreme only has a potency for dry because it is at the extreme end of the contrariety axis. That potency to be dry comes from a distinct actual property, namely that it is actually wet. The potency to be dry or cold are not actual properties of the essence of Air, but they are potential properties of that essence. To know everything about how a

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192 GC II.8 334b20-28.
193 Having this potential does not mean that the object in question will survive the change. Corruption is a real possibility for material objects. While the object may not survive the potential changes it has, that does not make those potencies less real. Just the opposite. These potencies are all too real because they indicate the potency for corruption had by a particular body.
given simple body exists essentially is to know both its essential actual properties and the potential properties that are entailed by its actual properties.

Turning to the simple bodies, let us consider their essences. What we have seen is that the simple bodies are determined by the pairing of two actual primary contraries: Earth by dry and cold; Air by wet and hot; Fire by dry and hot; Water by wet and cold. Now that we know that there are essential potential properties related to these essential actual properties, we can also list the ways each element exists potentially. The following chart lists those properties:

<table>
<thead>
<tr>
<th>Elements</th>
<th>Exist Actually</th>
<th>Exist Potentially</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth</td>
<td>Dry and Cold</td>
<td>Wet and Hot</td>
</tr>
<tr>
<td>Air</td>
<td>Wet and Hot</td>
<td>Dry and Cold</td>
</tr>
<tr>
<td>Fire</td>
<td>Dry and Hot</td>
<td>Wet and Cold</td>
</tr>
<tr>
<td>Water</td>
<td>Wet and Cold</td>
<td>Dry and Hot</td>
</tr>
</tbody>
</table>

When we talk about how “earth” exists actually, we say it is dry and cold. When we talk about how “earth” exists potentially, we say it is wet and hot. These existentially potential properties tell us what sorts of bodies it can interact with in order to change. So, if two bodies of earth come into contact they will not change, since neither is in potency to change into the other. These potential properties really exist, but do not exist as actual properties.

What, then, happens in the case of mixtures? In mixtures an intermediate property is determinative of that body. As I discussed in chapter two, in section 2.3, the intermediates “reduce” to the primary bodies in that there is a dependence relation, i.e. the intermediates need some feature of the primary elements to be fully defined. This fact is observed in the example of text (III)(b), which says that a particular mixed body is neither hot nor cold, but some other property, let us call it “warm.” This body is not actually hot and is not actually cold, but is actually warm. But it also has an interesting set of potential properties: it is potentially hot and cold at the same time. How? Because the warm body can change in both directions, so as to become hotter or colder. So, it has both potencies. This is a result of the intermediate character of its defining property, i.e. that this property comes from both extremes. So, “warm” comes to be “from” both hot and cold in the sense that it has a necessary reference to both in its potencies.

Therefore, the extremes of hot and cold do have a sort of existence in the essence of the actuality of “warm,” but only with respect to their potential properties not their actual properties. In fact, what makes the property “warm” an intermediate is that it has the potencies of both extremes: it is potentially hot and cold. If we are talking about a particular mixture, say flesh, and we say that flesh is not actually the simple body earth, but is potentially the simple body earth, we are saying that flesh is not actually cold and dry in the extreme, but that flesh is potentially hot and wet and therefore able to change so that it becomes hotter and wetter. So, the simple body earth exists potentially in flesh insofar as flesh has the exact same potential properties as the simple body earth, but not the actual properties of the simple body earth.

One may ask: why does Aristotle talk about potential existence at all? Why not just say that mixed bodies have potencies for changes into all four primary qualities? There appear to be two reasons for talking about potential existence. First, all mixed bodies consist of proportions of

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194 I should note that the grammatical structure used to describe the dependence of the intermediates is the same in (IV)(b) as it is in the passages from Phys. 1.5 and Met. X that I discussed last chapter. Both “flesh” and “bone” are described as being from the primary bodies ἐκ τὸῦ τοῦτοῦ. So, even Aristotle’s manner of describing the relation between intermediates and the primary bodies is consistent with this passage.
both extremes. We can only identify these proportions by identifying the degree of potency to change toward either extreme. By identifying the greater and lesser degrees of potency an intermediate has we can determine its nearness or distance from an extreme. This calculation of proportion, however, is best understood in terms of amounts of elements from which a mixed body comes. So, the concept of potential presence does enable us to understand the potencies for change in a mixed body. There is a second reason. Only taking into account the qualities, rather than pairing together qualities into proportions of simple bodies, does not give Aristotle the sophistication he needs to explain observable chemical changes. But if we group potencies together in terms of simple bodies, such that a body is not just a proportion of hot and a proportion of wet, but of air (hot and wet), then we will be able to account for the diversity of ways non-living bodies interact. We will see why that is the case in the next section.

In sum, when a simple body is present potentially in some substance, we are saying that the potential properties of that body exist in the mixture, but not its actual properties. It is this presence that gives the body that contains these potentially present elements the ability to interact with other bodies.

3.2.2: How the mechanisms of change work in a mixture

Keeping the notion of potential presence in the background, we are now ready to examine the mechanisms of change in mixtures in greater detail. Remember that in the natural changes discussed in chapter two there is a reciprocity to the change such that the interacting simple bodies exchange some or all of their contrary properties. These exchanges get more complicated with mixtures, but the mechanisms of change in mixtures are reducible to those at work in the changes between simple bodies, thus making the mechanisms of change in mixtures the same in kind with those of simple bodies. Seeing exactly how we can reduce the mechanisms of change in mixtures to the mechanisms of change between simple bodies will help us to see why the mechanisms of change peculiar to living bodies do not reduce to the mechanisms of change in simple bodies. To get at the details of the mechanism of change in mixed bodies, however, we will need to get into the particulars of how Aristotle determines material make up. For that, I am going to focus on how he describes material compounds and changes between those compounds in the Meteorology. There are many examples for the general principles I am going to illustrate, but I will give only a limited set here. The examination of a small selection will be sufficient for our purposes because the point of this exercise is to show that my reading of Aristotle’s theory of natural change in simple bodies is able to model for us the kinds of change that he describes in the Meteorology between mixed non-living bodies.

There are two important features Aristotle adds to his mechanisms of change in the Meteorology that help to explain change between mixtures. The first is the categorization of the wet/dry contrariety as “receptive” (pathētika) qualities and the hot/cold contrariety as “agential” (poiētika) qualities.195 This categorization is important to keep in mind because, as we shall see, understanding the mechanisms of change in mixtures requires that we understand which qualities and bodies have priority in causing changes. Having the distinction between agential and receptive properties gives Aristotle a more sophisticated way to prioritize which body is the

195 NB: In the Oxford translation, ποιητικά is translated as “active” and παθητικά as “passive.” I prefer the translations I have given here because they express the interactive character of the words better and they more clearly distinguish them from being-actually and being-potentially. I have changed the following translations to fit with my preference expressed here.
agent in a change over and above the formprivation prioritization of the contrary qualities. That he uses this distinction in the *Meteorology* is clear. For example, consider the following quotation:

(IV)  
(a) We have explained that the causes of the elements are four, and that their combinations determine the number of the elements to be four. Two of the causes, the hot and the cold, are agential; two, the dry and the moist, receptive. We can satisfy ourselves of this by looking at instances (*ek iēs epagōgēs*). (b) In every case heat and cold determine (*horizousai*), conjoin (*sumphuousai*), and change (*metaballousai*) things of the same kind and things of different kinds, (c) moistening (*hugrainousai*), drying (*xērainousai*), hardening (*sklērunousai*), and softening (*malatousai*) them. (d) Things dry and moist, on the other hand, both in isolation and when present together in the same body are the subjects of that determination and of the other affections enumerated. The account we give when we define their natures shows this too. (e) Hot and cold we describe as agential, for combining is a sort of activity; moist and dry are receptive, for it is in virtue of its being acted upon in a certain way that a thing is said to be easy to determine or difficult to determine. So it is clear that some are agential and some receptive.  

The division outlined in (IV)(a) makes sense when we remember the definitions of hot/cold, dry/wet in *GC* II.2 329b26-32, which we looked at in chapter two. The hot/cold contrariety characterizes the way different bodies interact, and so they are the agential qualities since they govern the interactions between bodies. The dry/wet contrariety determines the constitution of the boundary of the body, and so naturally relates to how receptive it is of another body. What (IV)(b) is describing is that the quality “hot” brings together things of the same kind, whereas “cold” brings together things of the same or different kinds. Finally, (IV)(e) draws the same conclusions as those of *GC* II.2, i.e. that one set of contraries is agential and another receptive.  

There is a feature of (IV)(c) that I want to point out that will be useful for our analysis of how mixtures interact. (IV)(c) indicates that hot and cold, as active qualities, initiate bodily interaction. In a sense we can say that hot and cold cause moistening, drying, etc. because once bodies interact by means of hot or cold qualities, then the receptive qualities can begin to change as well. As Aristotle says later in the chapter, “For the moist and the dry were their matter, and the operation of the agential qualities caused the dry to be determined by the moist.” Whether a body moistens or dries in an interaction will depend on the proportion of the qualities in each body and the way the bodies interact through their agential qualities. The reason I am highlighting this is that the hot/cold contrariety has a privileged role in determining when and how interactions occur, since bodily interaction is initiated by the elements in that contrariety. That will have an impact on which body in an interaction is considered an agent and which a patient.  

Another feature about the elements and their mixtures will also have an impact on which body in an interaction is the agent and which the patient. Even though all mixed bodies (or what

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197 *Meteo*. IV.1 379a8-11.  
198 “The elements of bodies, that is, the receptive ones, are the moist and the dry; the bodies themselves are compounded of them and whichever predominates determines the nature of the body; thus some bodies partake more of the dry, others of the moist” (*Meteo*. IV.4 381b24-27)
Aristotle called homogeneous bodies) are mixtures of all four elements, nevertheless they are characterized by the element(s) that predominate.\textsuperscript{199} What is more, Aristotle thinks that the characterizing element in the mixture is further determined by only one of the two qualities that constitute its nature. "Nevertheless (\textit{ou mēn alla}), since they are four, each of them is characterized (\textit{henos hekaston esti}) simply by a single quality: Earth by dry rather than by cold, Water by cold rather than by moist, Air by moist rather than by hot, and Fire by hot rather than by dry."\textsuperscript{200} This is more than a taxonomic statement on Aristotle’s part. For just previous to this passage Aristotle was describing how the predominance of the elements determine where the body’s natural motions tends and which bodies are contrary to one another. The “nevertheless” (\textit{ou mēn alla}) identifies a restriction on the previous claim, indicating that the contrary bodies are not contrary because of both qualities associated with the predominant element, but because of only one.\textsuperscript{201} So, on the one hand, a body with a predominance of earth, will be mostly dry (a receptive contrary) and therefore it is more likely to be a patient. On the other hand, a body with a predominance of fire will be largely determined by the quality “hot,” and therefore more likely to be an agent in bodily interaction. I say more or less “likely” because the differences between bodies are not just due to these qualities, but the actual differences that determine a particular mixture as well.\textsuperscript{202} Nevertheless, these differences, like being brittle or durable, will be more or less dry, more or less wet, more or less hot, and more or less cold.\textsuperscript{203}

Because certain simple bodies and mixtures are predominated by agential qualities and others by receptive qualities, Aristotle indicates that we have another tool for analyzing change between mixed substances and prioritizing which body is the cause of change. He writes, “Now there are two causes besides matter, the agent and the quality brought about, the agent being the efficient cause, the quality being the formal cause.”\textsuperscript{204} Which of two bodies is the agent-body is determined by which agential quality (i.e. hot or cold) among the interacting bodies initiates the interaction. This is because the hot/cold contrariety governs how bodies interact with one another, and examining this contrariety will help us to determine which body is the efficient cause of the change. The formal cause of the change is distinct from the efficient cause, in that once we have determined which body is the efficient cause then we can understand which forms (i.e. qualities) will be exchanged, and the forms that are exchanged are the formal causes of the change. Aristotle explains this is greater detail:

\textsuperscript{199} “The bodies themselves are compounded of them and whichever predominates determines the nature of the body; thus some bodies partake more of the dry, others of the moist. All the forms to be described will exist either actually, or potentially and in their opposites: for instance, there is actual melting and on the other hand that which admits of being melted.” (\textit{Meteo. IV.4 381b23-28})

\textsuperscript{200} \textit{GC} II.3 331a3-6.

\textsuperscript{201} Cf. Smyth, n.2767 for the use of \textit{οὐ μὴν ἄλλα}.

\textsuperscript{202} “Homogeneous bodies differ to touch by these affections and differences, as we have said. They also differ in respect of their smell, taste, and color. By homogeneous bodies I mean, for instance, the stuffs that are mined—gold, copper, silver, tin, iron, stone, and everything else of this kind and the bodies that are extracted from them; also the substances found in animals and plants, for instance, flesh, bones, sinew, skin, viscera, hair, fibers, veins (these are the elements of which the non-homogeneous bodies like the face, a hand, a foot, and everything of that kind are made up), and in plants, wood, bark, leaves, roots, and the rest like them.” (\textit{Meteo. IV.10 388a10-21})

\textsuperscript{203} “The homogeneous bodies, it is true, are constituted by a different cause, but the matter of which they are composed is the dry and the moist, that is, water and earth (for these bodies exhibit those qualities most clearly). The agents are the hot and the cold; for they constitute and make concrete the homogeneous bodies out of earth and water. Let us consider, then, which of the homogeneous bodies are made of earth and which of water, and which of both.” (\textit{Meteo. IV 10 388a21-26}) Also, cf. \textit{Meteo. IV.10 389a21-29}.

\textsuperscript{204} \textit{Meteo. IV.5 382a28-29}.
As we have explained, the agent operates by means of two qualities and the patient is acted on in virtue of two qualities: action takes place by means of heat or cold, and the quality is produced either by the presence or the absence of heat or cold since concretion is a form of drying, let us deal with drying first. Now that which is acted upon is moist or dry or a compound of both. Water is the element characterized by the moist, earth that characterized by the dry, for these among the elements that admit the qualities moist and dry are receptive. Therefore cold, too, being found in water and earth (both of which we recognize to be cold), must be reckoned rather as a receptive quality.

What this passage tells us is that we can also include cold as a receptive quality in certain circumstances, especially when water or earth are the predominant simple bodies in the mixture. This remark gives a new layer of priority, making heat the most agential quality, with fire being the most agential of all the simple bodies since it is the simple body characterized by heat. In sum, the previous analysis of qualities with respect to agent/patient qualities is a general way in which we can tell which body in an interaction is more likely to be the agent as opposed to the patient.

With that general apparatus established, we are now in a position to understand some of Aristotle’s statements about how changes happen when different mixtures interact. Aristotle gives many examples of such interactions in the Meteorology, but all I need to establish my interpretation is to show that an otherwise confusing passage of the Meteorology makes much more sense in light of my reading. To that end, what I will do is to examine a short passage where Aristotle discusses when mixtures can and cannot be vaporized and see how it can be better understood in light of the tools of analysis I have outlined above. The passage in question is typical of how Aristotle describes chemical interaction in the Meteorology but is both short enough and dense enough to provide us with a variety of different ways chemical interaction can be analyzed. Understanding how these complicated chemical mixtures interact will help us to identify why the powers of the vegetative soul are different in kind.

The passage is as follows:

Those liquids (tōn hugrōn) that go off in vapor (exatmizetai) are made of water, those that do not are either of the nature of earth, or a mixture of either earth and water, like milk, or of earth and air, like wood, or of water and air, like oil.

The first part of this discussion concerns vaporization of liquids. One thing to note is that the word we translate as “liquids” is the same word denoting the quality of wetness. So, the category of bodies we are discussing are those that are characterized by moisture. The change of the body is into a vapor of some sort, which is a body that is characterized by the qualities of air, i.e. wet and hot. The way one changes a wet-body into a body primarily composed of air is by adding heat. With that in mind, it is fairly easy to see why it is that a liquid body that is vaporized by heat must be primarily composed of water. If heat is added to the watery body, then the coldness of the water is exchanged with the heat, thus producing air. This can be formalized in the following way:

205 Meteo. IV.5 382a31-382b6.
206 Meteo. IV.10 388a29-31.
7) \([C/W]_{\text{water}} + [H/?]_{\text{heat source}} \Rightarrow [H/W]_{\text{vapor}} \text{ and } [C/?]_{\text{cold body}}\)

The brackets indicate the individual bodies and the letters the qualities. The “+” indicates interaction. The bodies to the left of the “⇒” are prior to changing and the bodies to the right of the “⇒” are post change. The question mark indicates that it does not matter which receptive quality the hot body has, because either way a vapor will result from the interaction, either by means of (G1) or (C). As this schematization shows, the vaporization of watery liquids is easy to understand. The heat source causes the interaction, giving its heat to the water, thus creating a vapor (i.e. a body composed mostly of air) and some kind of cold body.

There is a similar ease in understanding why it is the case that adding heat to an earthy body will not vaporize it. Earth is primarily cold and dry. If one adds heat to it, the body remains dry and no airy substance is generated, because air is wet as well as hot. Consider the following schematization:

8) \([C/D]_{\text{earth}} + [H/?]_{\text{heat source}} \Rightarrow [H/D]_{\text{fire}} \text{ and } [C/?]_{\text{cold body}}\)

If the combination of something hot with earth could vaporize the earth, the right side of the schematic would show some combination of air (i.e. [H/W]). No matter what the heat source is, the possible changes will not result in some airy substance at the end of the change.

With the easy cases out of the way, we can turn our attention to the complicated considerations that come with complicated mixed wet bodies. The first is a liquid body that is a mixture of earth and water (the “milk” in text (VI)). This body is agentially cold from the elements that predominate, but with respect to its receptive qualities it is some intermediate between wet and dry. In the schematizations that follow, I will keep the symbolic proportions fairly simple by representing the simple bodies in equal proportion. What happens when fire interact with the mixture?

9) \([(C/W)&(C/D)]_{\text{milk}} + [H/D]_{\text{fire}} \Rightarrow [(H/D)&(C/D)]_{\text{mixture 1}} \text{ and } [C/W]_{\text{water}}\)

First we have to determine which body is the agent. Because milk and fire are unlike one another in their elemental profile, the cold body will be the agent, since cold causes interactions between unlike bodies and like bodies, whereas hot only causes an interaction between like bodies. So cold causes the interaction between the bodies. But once they are interacting, the receptive qualities tell us which elements will be exchanged. Since the earth element in milk and fire share the same receptive quality, the exchange will be between the water element and the fire element. Thus, in this interaction, the two bodies that result is a dry mixture with an intermediate agential quality and water. Neither of these are vapors, so vaporization has not occurred.\(^{207}\)

\(^{207}\) It is rather hard to believe that Aristotle did not think that boiling milk gives off a vapor, but this is what he indicates in text (VI), so I must give an explanation for why he says this. It turns out that my reading of Aristotle’s chemistry gives us such an explanation, even if our experience of boiling milk gives the lie to the reality. However, one may approach understanding his claim from an empirical standpoint if we consider that in the cheese making process heated milk separates into curds and whey (i.e. a watery substance and an earthy substance). Something like how cheese is made from heated milk may be what Aristotle has in mind here when he says that milk does not vaporize. This is, of course, speculation. Because of the difficulty of discerning the empirical evidence behind Aristotle’s claims in text (VI), I am going to keep our discussion here abstract since that is the best way to explain what Aristotle means in text (VI).
What if one makes air to be the agent of change with bodies of the same profile?

\[10) [(C/W)\&(C/D)]_{\text{milk}} + [H/W]_{\text{air}} \Rightarrow [(C/W)\&(H/W)]_{\text{mixture 2}} \text{ and } [C/D]_{\text{earth}}\]

A similar logic can be applied to this interaction, except that the air will interact with the earth element in the milk since the earth element differs from the air with respect to the receptive quality. The resulting mixture 2 is a wet body with an intermediate agential quality. This mixture is somewhat similar to air, but it appears that Aristotle does not think it will be a vapor.

Then Aristotle gives an example of a mixture that consists of earth and air. The first thing to note is the bizarre example of “wood” (\textit{xulon}) as a “liquid” (\textit{hugron}). This example should remind us that he is not necessarily treating of liquids in the way we normally use that word, but as any moist body whatsoever. I have kept the translation, however, because it is common enough that we should note how the terms have a slightly different meaning for Aristotle than we might think at first. What makes this body moist is not that it is composed of water, but of air.

We can see the possible transformations by means of fire in the following scheme:

\[11) [(C/D)\&(H/W)]_{\text{wood}} + [H/D]_{\text{fire}} \Rightarrow [(H/D)\&(H/W)]_{\text{mixture 3}} \text{ and } [C/D]_{\text{earth}}\]

\[12) [(C/D)\&(H/W)]_{\text{wood}} + [H/D]_{\text{fire}} \Rightarrow [(C/D)\&(H/D)]_{\text{mixture 4}} \text{ and } [H/W]_{\text{air}}\]

Without my interpretation of the mechanisms of change, both (5) and (6) are possible ways for mixture to occur in these situations. Yet, Aristotle excludes (6) as a possibility in text (VI), since that would be a vaporization. How does my interpretation show that (5) is not possible while (6) is possible? Note that in (5), the fire interacts with the element of earth in a (G1) change, and the result is mixture 3 and earth, whereas in (6) fire interacts with the element of air in a (G1) change. Does Aristotle have a way of explaining why the fire would not interact with the air potencies in the mixture? Yes. In this situation, the wood is the agent since, having an element of cold, it can cause an interaction between unlike bodies. But why does the earth element in the wood interact with the fire rather than the air element? The air element differs from fire in that air is wet while fire is dry. This means that they are different, and so as a hot element air is not naturally inclined to interact with unlike bodies. But the earth element, as a cold body, is inclined to interact with unlike bodies. Therefore, the exchange happens between the earth element and the fire. That is why (5) describes the change and (6) does not.

Lastly, Aristotle gives the example of a mixture of water and air. The transformation possibilities are as follows:

\[13) [(C/W)\&(H/W)]_{\text{oil}} + [H/D]_{\text{fire}} \Rightarrow [(H/D)\&(H/W)]_{\text{mixture 5}} \text{ and } [C/W]_{\text{water}}\]

\[14) [(C/W)\&(H/W)]_{\text{oil}} + [H/D]_{\text{fire}} \Rightarrow [(C/W)\&(H/D)]_{\text{mixture 6}} \text{ and } [H/W]_{\text{air}}\]

An interpretation along the lines of the last example can help to understand why (7), and not (8) occurs when these bodies mix. Again, the oil is the agent body, since it has the cold element and

\[208\] That being said, listing “wood” among the wet bodies is still unintuitive. It is comforting to note that this remark was puzzling to ancient commentators as well. I think he might consider it wet because wood produces sap when cut. Alexander of Aphrodisias gives the following explanation for including wood among the liquid bodies: “Aristotle may be speaking here of green wood, that is also moist.” (In Meteo. 220, 3-4)
the cold element brings together unlike bodies. For reasons similar to the analysis of change in earth and air mixtures, I think Aristotle would exclude the possibility that fire would interact with the air potencies, i.e. because the heat of the air inclines it to interact with like bodies and fire is dry, and therefore unlike air. The cold of the earth element, then, makes that element the one likely to enter into the exchange.

From these considerations I think we can identify an important lesson about Aristotle’s chemistry. An analysis of text (VI) which only takes into account the qualities of the interacting bodies would not be enough to understand why Aristotle says that some of the mixtures can vaporize and others cannot. After all, schemes (6) and (8) are two examples of how one can get a vaporization of a mixture contrary to Aristotle’s own stated position. However, if we take into account how the elements remain in potency in a mixture and what bodies are agents of change and then which receptive qualities determine the exchange in the change, we can make sense of the text with which Aristotle presents us. Without the presumption that the elements exist in a mixture in potency, and without my way of reconstructing how Aristotle prioritizes which elements exchange qualities, we would not be able to understand why Aristotle makes the claims he does about vaporization in text (VI).

Another point of our examination into Aristotle’s chemistry was to show that even though mixtures involve complicated change relations, nevertheless the basic features of change that he described in relation to the simple bodies is at work in the changes between mixed bodies. This means that the changes of non-living mixed bodies are reducible to the changes between two primary contrarieties their intermediates when these bodies interact. How we can reduce changes in mixture to the changes between simple bodies should be clear from my discussion of text (VI). Understanding how the mechanisms of change between mixed bodies is reducible to the mechanisms of change between simple bodies sets up more clearly how we can identify a change that is not reducible to the mechanisms of simple bodies. Aristotle himself sets up this possibility when he writes:

(VII)  (a) Now heat and cold and the motions they set up as the bodies are solidified by the hot and the cold are sufficient to form all such parts as are the homogeneous bodies, flesh, bone, hair, sinew, and the rest. For they are all of them differentiated by the various qualities enumerated above, tension, ductility, fragmentability, hardness, softness, and the rest of them: all of which are derived from the hot and the cold and the mixture of their motions. (b) But no one would go so far as to consider them sufficient in the case of non-homogeneous parts (like the head, the hand, or the foot) which these homogeneous parts go to make up. (c) Cold and heat and their motion would be admitted to account for the formation of copper or silver, but not for that of a saw, a bowl, or a box. (d) So here, save that in the examples given the cause is art, but in the non-homogeneous bodies nature or some other cause. 209

What is it about these heterogeneous bodies that makes knowledge of the elemental profile insufficient to understand them as bodies? It is the problem of unity. This problem of unity is indicated by the fact that mixed bodies have a unified motion based upon their elemental profiles and the reducibility of their changes to the mechanisms of changes between simple bodies. Therefore, because heterogeneous bodies have motions that are not so reduced, in (VII)(d)

209 Meteo. IV.12 390b3-14.
Aristotle says we need some “nature or some other cause” to explain the motions proper to heterogeneous parts. In other words, we need a nature or cause that can explain why the heterogeneous bodies act in unison in a new kind of change or motion. Because there is a unified action that is not explainable by the natural changes described above, we can use this novel action to prove the existence of a new kind of form, one that Aristotle calls a “soul” and which he predicates of all living beings. In the rest of this chapter we will examine why the soul is a natural principle, what contraries are unique to it, why the actions of a living body cannot be reduced to the four elements, and how it differs from artifacts.

3.3: Soul and its distinctive functions

Before we turn to a discussion of “soul” in particular, we need to pause for a brief moment to talk about forms. In the first two chapters I focused on Aristotle’s understanding of natural change as rooted in contrary qualities that are exchanged. When discussing the simple bodies my focus was on the primary qualities. In this chapter so far I have tried to show how chemical changes between mixed bodies reduces to the same mechanisms of change as that between simple bodies, with the addition of priority relations. That discussion of mixtures has necessarily focused on the “matter” side of Aristotle’s hylomorphism. But before we can understand soul, we must take a moment to consider the notion of “form” or “essence,” and how we may be able to identify it apart from the matter.

When Aristotle discusses simple bodies in GC, he never refers to combined qualities as the “form” of the simple body. Instead, he only ever refers to them as qualities or “differences.” At first blush this may seem like a distinction without a difference, since Aristotle often associates the discovery of the difference with the discovery of the form. Many have presumed that the two differences in the simple bodies may be considered to constitute the form. However, in an article on GC I.10, Dorothea Frede opines that this silence on the form of simple bodies is important. She reads it as evidence against the notion of prime matter in Aristotle’s physics. The reason she gives is that if there is no form/matter distinction on the elemental level, there is no need to talk about the form. I think she is right in identifying that there is a reason why Aristotle does not call the qualities “forms” of simple bodies, but I think she has come to the wrong conclusion about the reason why. I think the fact that Aristotle does not call the qualities of simple bodies “forms” is evidence that the simple bodies do not have actual existence. If the simple bodies do not have actual existence, they would not have proper forms. Because they have only potential existence, then it makes sense that they can be identified only by qualities that distinguish them.

That last point is important because it is only at the level of homogeneous bodies that we begin to see Aristotle talk about “forms.” This is because, on my reading, the homogeneous bodies have actual existence, unlike the simple bodies. He writes:

(VIII) Our account of the formation of the homogeneous bodies has given us the elements out of which they are compounded and the classes into which they fall, and has made it clear to which class each of these bodies belongs. The homogeneous bodies are made up of the elements, and all the works of nature in turn of the homogeneous

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211 For purposes of full disclosure, my disagreement is partially based on the fact that I think Aristotle is committed to prime matter.
bodies as matter. **All the homogeneous bodies consist of the elements described, as matter, but their essence is determined by their definition.** This fact is always clearer in the case of the later products, of those, in fact, that are instruments, as it were, and have an end: it is clearer, for instance, that a dead man is a man only in name.\(^\text{212}\)

The “definition” that Aristotle mentions here is referring to the form. It is notable that this definition of the forms of homogeneous bodies considers more than just the proportion of simple bodies in the mixture. It turns out that the forms of homogenous bodies are like the forms of intermediates, which have a proportion of the extreme contraries but with a new property that determines the proportion of the extreme contraries present in the mixture. Just as a new property is what determines the intermediate, so the form of a homogeneous body also determines the proportionate mixture of the extreme contraries and elements.

But there is something else that Aristotle says in text (VIII) that we must keep in mind, i.e. the fact that it is hard to discern the form of mixtures. That is because it is harder to discern their “end” or final cause. Mixtures do not obviously have a distinctive operation over and above the acts and potencies of the qualities that compose them. This is because we can understand their operations just by identifying the mechanisms that lead to change between any given non-living bodies. That is not to say that there is no proper *telos* for these bodies, but that it is hard to distinguish the *telos* of the bodies from the potencies of their essential elemental profile. Aristotle indicates this when he writes:

\[ (IX) \]

\[ \text{But in the case of flesh and bone the fact is not so clear to see, and in that of fire and water even less. For the end is least obvious there where matter predominates most. If you take the extremes, matter is pure matter (\textit{hē men hulēouden allo par' autēn}) and the essence is pure definition (\textit{hē d' ousiaouden allo ē logos}); but the bodies intermediate between the two are related to each in proportion as they are near to either. For each of these elements has an end and is not water or fire in any and every condition of itself, just as flesh is not flesh or viscera viscera, and the same is true in a higher degree with face and hand.}^\text{213} \]

What Aristotle is pointing out in text (IX) is that we normally understand the definition or essence of a thing in relation to its final cause. On the one hand, he presumes that it is difficult to discern the final cause in the case of non-living mixtures. On the other hand, he notes that mixtures in living bodies are easier to define since their final cause is distinct from their material composition. So, flesh and viscera have a purpose that is distinguishable from their material composition, and this is even more obvious in the case of heterogeneous parts of a living body, like a hand or a face. But this is not so easy in the case of independent mixtures (i.e. mixtures that are not parts of some whole), since they do not seem to have a function over and above the natural powers of interaction that derive from the elements. Yet, it is clear that for Aristotle a thing’s form always gives it a determined function (\textit{tōi ergōi}):

\[ (X) \]

\[ \text{[A] thing really is itself when it can perform its function; an eye, for instance, when it can see. When a thing cannot do so it is that thing only in name, like a dead eye or} \]

\(^{212}\) *Meteo.* IV.12 389b25-32.  
\(^{213}\) *Meteo.* IV.12 390a2-10.
one made of stone, just as a wooden saw is no more a saw than one in a picture. . . .
The parts of plants, and inanimate bodies like copper and silver, are in the same case.
They all are what they are in virtue of a certain power of action or passion—just like flesh and sinew.\textsuperscript{214}

Knowing the function of a body tells us a lot about its nature. After all, if the functions of a body are explainable in terms of the elemental composition of that body, then we know it has a nature that is reducible to the elements that compose it. However, it is hard to identify this function in mixtures because all their actions are reducible to the properties of the proportions of simple bodies that compose them. Despite the difficulty in identifying the proper final cause of elements and mixtures, we can nevertheless get by simply by understanding their elemental profile and how the interactions between the elements of mixtures determine the changes and motions. But, turning back to living things, it is not possible to reduce the actions of organic bodies to combinations of their elemental profiles. The principal reason is that there simply is no mechanism from the elements that permits parts made of different homogeneous mixtures to unify in a common action without changing into one another. That is precisely the kind of action we observe happening in organic bodies. Identifying these non-reducible functions, therefore, will give us a place to look for a new mechanism of change that is different in kind from the mechanisms of change found in non-living bodies.

The distinguishing material characteristic of living bodies is that they are combinations of mixed bodies formed into one substance. This fact explains why the basic definitions of soul that Aristotle gives is the “first actuality of an organic natural body.”\textsuperscript{215} On the face of it, the definition is merely descriptive: the form just is a form of a body with multiple heterogeneous parts. While Aristotle will need to provide different kinds of soul with further specification, this general definition will be true of all souls. It will be helpful to briefly review the definition in order to highlight aspects of it that will help us to discern the special features of soul that differentiates it from the forms of non-living substances.

When Aristotle says that the soul is the “first actuality” he is indicating the essential form that unifies the matter into one substance. In the case of non-living substances, the first actuality is the essence that is determined by an intermediate property and the elemental proportions inherent in that property. The elemental proportions tell us about how the homogeneous body is prepared to interact with other bodies because of the potencies that come along with the actual form. In an important way, the specifying intermediate unifies the body, because it contains within it all the potencies to act and change. Because there can be only one actual intermediate in any given mixture, every non-living body must be homogeneous. As a first actuality, the soul will have to be such a unifying principle for the living body. However, it will be a different kind of unifying principle because it brings together heterogeneous bodies, and so it cannot be merely an intermediate of the primary qualities. This is the first indication that we are dealing with something more than just a complicated chemical interaction.

We might wonder: why do living bodies have to be composed of heterogeneous parts? That is because of another feature of the definition of soul: that the soul is the actuality of a “natural organized body.” I want to focus on “organized” in this definition because the translation here is a bit misleading in English (which cannot be avoided). The Greek word is \textit{organikou}, which is the word that can be translated as “possessing an organ” or “instrument.” By

\begin{itemize}
\item \textsuperscript{214} \textit{Meteo}. IV.12 390a10-19.
\item \textsuperscript{215} εἴη ἂν ἐντελέχεια ἡ πρώτη σώματος φυσικοῦ ὀργανικοῦ. (DA II.1 412b5-6)
\end{itemize}
saying that the body is “organized” Aristotle indicates both that there are parts constituted by different mixtures, and that at least some of these parts are “instruments” of action. For example, Aristotle describes the organs of a plant in terms of their uses: “And even the parts of plants are organs, although altogether simple ones. For example, the leaf is a shelter of the outer covering, and the outer covering of the fruit; and the roots are analogous to the mouth, since both draw nourishment.”

The feature I want to highlight is that it is necessary for a body to have heterogeneous parts if it has diverse organs, as even plants seem to have. It is the multiplicity of heterogeneous parts that allows us to distinguish ensouled bodies from non-living bodies.

But again, why must the soul be specifically different from the forms of non-living things? In answer to that question I suggest we examine Aristotle’s arguments against some views of his predecessors, principally the view that the soul could be a harmony among the elements or one of the elements itself. This view is an important competitor, because, as we saw with non-living bodies, their forms just are the ratios of the mixtures that constitute them. The harmony theory is an important rival because it seems initially plausible as an extension of the form-as-ratio theory applied to non-living bodies. So, whereas non-living things can be explained by means of the ratios that compose the mixture, a harmony would be a proper ratio between the diverse mixtures that compose the organized body of the living thing.

Aristotle articulates the claims of his rivals in the following way: “For they say a [harmony] is a blending (krasin) and a compounding (synthesin) of opposites, and that the body is composed (sygkeisthai) out of opposites.”

Aristotle provides some objections to this theory. The first concerns the definition. He points out that a harmony is not really different from a ratio. He says “And yet a [harmony] is a certain proportion of things mixed together, or a compounding of them, and a soul can be neither of these.” He does not give any more detail to this argument, so we have to try to understand it in comparison with other texts. If we take into consideration what he says in text (VIII), we can understand him to mean that no amount of mixing is sufficient to explain the unique interactions of the body parts that compose a living being. If the harmony were a ratio of the elements found throughout the body as a whole, this higher order ratio would not explain why individual parts act differently from other parts, since

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216 DA II.1 412b1-4. All translations of the De anima are from the Shields 2016 unless otherwise noted.

217 It is the requirement that living bodies be composed of heterogeneous parts that allows us to distinguish soul-forms from other corporeal forms. Aristotle can posit the existence of a new kind of form precisely because its unification of diverse materials into one being. So, the primary way some body is one is the unity found in simple bodies and compounds: it is homogeneous throughout. Soul provides an oneness to bodies that would otherwise be considered different bodies. Scholars, like Jennifer Whiting, also remind us that Aristotle defines the organs of a living body according to their function, which is distinct from their material makeup (Cf. Whiting 1992, 86-87). These functions are essential parts of the soul and require a diversity of bodily parts in order to operate. So, the soul requires a multiplicity of bodily parts in order to function properly, but we can recognize that a body is ensouled when it has a multiplicity of parts that operate as a unity in a way that the material composition of those bodies cannot explain.

218 DA I.4 407b30-32. Shields translates ἁρμονίαν as “attunement,” but I have a preference for the transliteration “harmony,” so I have modified his translation to fit that preference and will continue to do so.

219 DA I.4 407b33-35.

220 Why should we think that a claim that Aristotle makes in the Meteorology can be used to interpret the DA? As David Furley convincingly argues, Aristotle does seem to use the discussion of the mechanics of elemental change in Meteorology as a theoretical framework for his zoological research. Cf. Furley 1981, 90-93. Lennox agrees. Cf. Lennox 2001, xiv. I take this connection, then, as a justification for presuming the remarks of that texts as a background for the claim here is the DA.
the harmony-ratio ranges over the whole of the body.\textsuperscript{221} Or if the harmony is a ratio of the arrangement of the homogeneous parts, that arrangement still does not explain the diversity of functions of the parts individually.\textsuperscript{222} What is more, even if we could concede that the collective relations of the parts one to another were enough to explain the new functions of the parts, Aristotle says that this harmony could not explain how the soul-harmony is the \textit{principle} of motion, which is a necessary condition for Aristotle’s notion of soul.\textsuperscript{223} The elemental ratios can explain how one body mixes with another through the mechanism of cold and heat, but this says nothing in particular about \textit{locomotion}, which nearly all his predecessors say is a power of living things. The general point here is that the harmony theory simply cannot explain the peculiar activities of soul in the same way that a mixture of the elements can explain the activities of non-living bodies.

The point of my examination of Aristotle’s criticisms of the harmony theory is to note that the activities of soul are different enough from the activities of the elements that the soul is recognized as a unique kind of principle. It is the uniqueness of soul as a principle that motivates the writing of the \textit{DA}: “For the soul is a sort of first principle of animals. We aim to consider and ascertain its nature and essence, and then its properties, of which some seem to be affections peculiar to the soul itself, while others belong to animals as well because of the soul.”\textsuperscript{224} It is different enough, in fact, that Aristotle begins by considering what the genus of soul could be.\textsuperscript{225} For our purposes we need to discover, or at least explain, why it is that certain objects are alive and not just artifacts. To do that, we need to identify a distinct function that is not the result of the component parts. For that, we will make a careful examination of the most basic of life activities, i.e. nutrition, to see why it cannot be reduced to the hot/cold mechanism of non-living bodies.

\subsection*{3.3.1: The novel contrariety of nutrition}

As we discovered in chapter one, all natural change occurs between contraries. Then in chapter two we discussed the four primary qualities that constitute two contrary axes that determine natural change for non-living bodies. Now that we have seen that living bodies have a novel form that unifies heterogeneous parts, we need to discover the novel contrariety that is unique to living bodies. To begin, we will examine the power of nutrition, since this power is the power of soul found among all living things and the most like the contrarieties of the elements.\textsuperscript{226} To do this, we must begin by examining what makes something “food,” for as Aristotle says “it is in virtue of this function that [nutrition] is marked off from other capacities.”\textsuperscript{227}

\begin{flushright}
\footnotesize
\textsuperscript{221} “For a mixture of elements does not have the same proportion for flesh and for bone. It will turn out, then, that a thing has many souls, all over its body, if all of its parts are compounded from the mixed elements, while the proportion of the mixture is [harmony], that is, a soul.” (\textit{DA} I.4 408a14-18)
\textsuperscript{222} “For there are many different compoundings of parts and they may be compounded in many different ways. Of what part, then, should one suppose that its compounding is reason? Or the perceptual faculty? Or the appetitive faculty? And compounded how?” (\textit{DA} I.4 408a11-13)
\textsuperscript{223} “Further, it does not belong to a [harmony] to initiate motion, but virtually everyone assigns this attribute more than any other to the soul.” (\textit{DA} I.4 407b34-408a1)
\textsuperscript{224} \textit{DA} I.1 402a6-10.
\textsuperscript{225} “It is presumably first of all necessary to determine the genus of the soul and what it is.” (\textit{DA} I.1 402a23-24)
\textsuperscript{226} Cf. \textit{DA} II.2 413a31-413b4.
\textsuperscript{227} \textit{DA} II.4 416a20-21.
\end{flushright}
Aristotle begins by stating that it seems that food is what is contrary to the living body.\textsuperscript{228} This may sound strange, since we often consider something like a corpse to be the contrary of a living body. Food is like a corpse in that both food and corpses lack life.\textsuperscript{229} But whereas a corpse is not in potency to become alive again by natural means, food is in potency to be part of a living body.\textsuperscript{230} Aristotle’s statement that food is the contrary to the living body gives us a starting point for investigating what makes food the contrary of a living body. The first thing to note is that what makes something food, and therefore gives it a potential to be part of a living body, is only partially related to its elemental composition. The same elemental composition can be food to some living things and not to others. A particular mixture, say chocolate, can be food to humans but poison to dogs. Some putrefying mixtures may be inedible to animals, but food for plants. Therefore, a particular mixed body is considered food only under certain conditions and may be food for some living things and not others without changing its material composition in any way.

Note, then, what Aristotle says makes something food:

\begin{quote}
\textbf{(XI) Nutrition seems to be from contrary to its contrary, though not from every contrary to every contrary, but only those contraries which have not only generation from one another but also growth (\textit{auxēsin}). For many things are generated from one another, but not all of them are quantities, as, for example, the healthy from the sick. Nor even among growing contraries does it appear that nourishment is reciprocally one from the other: whereas water is nourishment for fire, fire does not nourish water.}\textsuperscript{231}
\end{quote}

What this quotation tells us is that one of the characteristics of food is that it must be able to increase the bulk of the body that is fed. The ability to increase the amount of body that is fed means that food must have some necessary relation to the proportion of mixtures of the body in the living being. The fact of that necessary relation is reflected in the way that fire increases its size. Aristotle tells us earlier in the chapter that fire is the only one of the elements that is said to be fed, presumably for the reason mentioned above: that when it combines with other bodies it increases in bulk.\textsuperscript{232} But why is fire “fed” and the other elements are “not fed”? Fire, being characterized by the quality “hot” acts so as to make other bodies like itself. To be fed, then, a body must be the agent of change and must engage in the change in order to make the other body like unto itself. This requires the right sort of relations between bodies such that the one being fed has an appropriate priority in interaction between bodies. So, a body can be food when it can

\footnotesize\textsuperscript{228} δοκεῖ δ’ ἐναντίον ἡ τροφὴ τὸ ἐναντίον τῷ ἐναντίῳ. (\textit{DA} II.4 416a21-22)
\footnotesuperscript{229} In fact, sometimes a corpse is food, for many animals eat the corpses of other animals.
\footnotesuperscript{230} In indicating that corpse is not in potency to be alive I mean the dead animal is not in potency to be alive in the same way it was (excluding miracles), although, as I mentioned in the previous note, the animal corpse is in potency to be alive insofar as it is food for another animal.
\footnotesuperscript{231} DA II.4 416a21-27.
\footnotesuperscript{232} “The nature of fire seems to some to be without qualification the cause of nourishment and growth, since among the bodies fire alone is evidently something which is nourished and grows.” (\textit{DA} II.4 416a9-12) He also writes in \textit{GC} II.8: “Hence it is reasonable that, whereas all the simple bodies come-to-be out of one another, Fire is the only one of them which (as our predecessors also assert) is fed.” (\textit{GC} II.8 335a16-18) This statement is nevertheless mysterious, for we might rightly wonder why water can nourish fire but fire cannot nourish water? I think it is because of the nature of hot and cold. Hot joins like things, and cold unlike things. Therefore, when fire consumes something it makes that thing like itself, whereas water need not do that by virtue of cold’s universal interaction. This makes sense with what Aristotle says later, for, as we will see, he insists that what makes something “food” is that it is likened to the one nourished.
be made into the body that is being fed. But this is not sufficient for something to be food, for simple fact that fire is not alive. Aristotle himself considers the idea that fire is the source of nutrition and growth, and then rejects that idea by observing that fire is only a “co-cause” (sunaition) with nutrition and growth. “The cause,” he writes, is, rather, the soul." For only the soul can explain why growth is limited in living things and not unlimited, like it is in fire. Therefore, the way in which one body assimilates another body to make itself grow is only a necessary condition for a contrary to be food for another, it is not a sufficient condition for determining what makes something food properly so called.

In the following discussion, Aristotle places the debate about the nature of food in the context of whether or not change is between things that are like or unlike. His answer with respect to food is similar to the answer he gives in *Physics* I.5-7: in a way food is like what is fed, but in a way it is not. Here he gives a careful distinction: “It makes a difference whether nourishment is what is added last or first. If it is both, in one instance undigested and in the other digested, it would be possible to call either nourishment. For insofar as it is undigested, contrary is nourished by contrary; and insofar as it is digested, like is nourished by like.” The point to take from this distinction is that the term “food” is ambiguous, because there are two different things before and after digestion, but we tend to call both food. For example, I call the banana on my plate “food,” but I can also refer to the digested material in my stomach “food.” The banana is unlike and contrary, while the digested food is “like” my body which has received it.

Aristotle will make use of this distinction, but before he gets there, he makes the claim that only what is alive can be properly said to be fed. He writes,

(XII) Since nothing which does not partake of life is nourished, what is nourished would be the ensouled body, insofar as it is ensouled, with the result that nourishment is relative—and not co-incidentally—to what is ensouled. There is a difference, however, between being nourishment and being able to produce growth in something. For insofar as an ensouled thing is a particular quantity, something is capable of producing growth in it, while insofar as it is some this and a substance, something is nourishment for it. For what is ensouled preserves its substance and exists as long as it is nourished.

The first thing we learn about the essence of a body that can be food is that it has a potency to be part of a living body. As I noted earlier, the potencies to change are related to the nature or essence of the changeable body. These potencies are the result of a privation of the form the subject is to receive in the change. What is unique about food is that it is constituted in such a way as to have a privation of the form of the living body. Aristotle does not clarify what this uniquely suitable property is that gives the proper privations, but it could be something like the correct proportion of elements with respect to the part of the body into which the food will be changed. When it is changed, it becomes “some this and a substance” and here I understand Aristotle to be referring to the food after digestion, when it has become “like” the living body.

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233 DA II.4 416a14-15.
234 DA II.4 416b3-7.
235 DA II.4 416b10-15. "First, he characterizes the nutriment as being essentially related to what is ensouled. This point cancels out the earlier comments about fire being nourished by water, if this is understood as a process not regulated by soul." (Johansen 2012, 102)
that is fed. Why? Because Aristotle indicates that it is *qua* nutrition that food preserves the body, not by adding to its bulk. Thus, something is food and feeds us when it becomes part of us.

This last clarification needs some unpacking, but there is one more distinction we must note before doing so. When food becomes part of us it stops being an independent substance and starts being a part of a complex substance. The change does not make the food into water, fire, metal, air, etc. Rather, it becomes part of the living organism, in the form of sap, blood, or the equivalent in non-blooded animals. Parthood gives the homogeneous body a new function that is not reducible to the elements from which it came. Consider what Aristotle says in *Meteo*. IV.12:

(XIII) The homogeneous bodies are made up of the elements, and all the works of nature (*hola erga tès phuseôs*) in turn of homogeneous bodies as matter. All the homogeneous bodies consist of the elements described as matter, but their essence is determined by their definition (*kat’ ousian tōi logōi*). This fact is always clearer in the case of the later products, of those, in fact, that are instruments (*organa*), as it were, and have an end; it is clearer, for instance that a dead man is a man in name only, just as stone flutes might still be called flutes; for these too, seem to be instruments of a kind. But in the case of flesh and bone the fact is not so clear to see, and in that of fire and water even less. 236

Function is what helps us to identify new intermediates in non-living bodies because functions are linked to the essence which determines both function and the matter from which a body is composed. As we saw earlier, non-living homogeneous bodies are reducible to the primary contraries because their interactions need nothing other than the primary contrarieties to be explained. But characteristic functions of the homogeneous parts of living organisms, like flesh, blood, and bone, need something other than the four primary contraries to explain the coordination with the living body as a whole. In other words, the homogenous bodies need another contrariety axis to explain why they are parts, and not independent wholes. Just as a hand apart from the body is no hand because it cannot perform its function, so apart from the body, blood or sap cannot perform their characteristic functions. 237 While Aristotle does often discuss the parts of the body in relation to their elemental profile, he is only discussing those properties insofar as they are co-causes with the living body of what is happening. The new contrariety we are observing here is that between *not being part* of an organism and *being part* of that organism.

This last claim may sound strange, because it would seem to imply that all natural bodies have some latent potency “*being food for x*” as part of their essences. That claim seems extravagant at best, and at worst just plain false. But as I noted above, there is an important distinction in Aristotle’s theory between food before and after digestion. The food before digestion does not yet have the potency to be part of the body. Instead, it has the potency to be corrupted and changed into a body that has an elemental profile like the parts of the living body. Once the process of digestion produces a body with a similar elemental profile to that of the living body, then the food that is being digested has an explicit privation of the form of the living body. In this way the predigested food is made like the body through the process of digestion in order to create in it a potency to become part of the body. Once the potency exists in the food, then it can be taken in by the body as nutrition.

236 *Meteo*. IV.12 389b26-390a3.
One place where we see this distinction between food being made like the body before being made part of the body is in a curious passage from *On Parts of Animals* (PA) II.3. Aristotle writes:

(XIV) (a) For while plants take their already worked-up nutrients from the earth by means of their roots (which is also why residues do not come about in plants, since *(dio) plants use the earth and its heat as a stomach*), virtually all animals, and clearly the locomotive ones, have the stomach cavity, like an earth within them. (b) From this they must somehow take the nutrients—just as plants do with their roots—until they reach the end of this continuous concoction.\(^\text{238}\)

Notice how in (XIV)(a), Aristotle indicates that the earth is the equivalent of a stomach for plants. What the earth does for plants that the stomach does for animals is that it does the initial concoction. Presumably this process is like the changes in non-living bodies that we have already seen, and the heat at work here is an elemental heat that brings like bodies together, which in effect sorts the component elemental parts into different bodies, as we saw in our examination of *GC* II.2 in the last chapter.\(^\text{239}\) But that process does not end in the earth, for Aristotle indicates that there is a continuous concoction happening when the plants take in food through the roots. We should note that “continuous” in the text does not mean that the changes in the earth and the living being are the same. There is a continuity, but not continuity that indicates the activities are the same. Rather, it is a continuity in process: first there is an elemental heat that concocts the food, and then there is a living heat that takes in the food as part of the body.\(^\text{240}\) As Malcolm Wilson writes, “the heat of the earth still concocts the food, but the plant by its own vital heat transforms it into the various plant tissues.”\(^\text{241}\)

\(^{238}\) *PA* II.3 650a20-27. NB: Unless otherwise stated, I will be using James Lennox’s 2016 translation in the Clarendon series.

\(^{239}\) Cf. *GC* II.2 329b26-32 and section 2.3 of chapter 2.

\(^{240}\) For the purposes of this chapter, I am going to label the heat proper to the vegetative powers as “living heat.” There is a concept in these works that Aristotle calls *θερμότης ψυχική* and is often translated as “vital heat.” I suspect that vital heat tracks what I am labeling “living heat” but the material is sufficiently complex enough that I do not yet feel justified in making that assertion. Part of the reason is that there is a heat involved in nutritive activity that is associated with the elements, and there are times when Aristotle’s usage seems to track that. (e.g. *GA* III.1 751b34-752a4) Also, *πνεύμα* seems to do a lot of the same work as the living heat that I am discussing here, and Aristotle does refer to *πνεύμα* as a source of heat. The untangling of these concepts is important, but it is not central to my task in this work. I will have to address the issue at another time.

\(^{241}\) Wilson 2020, 169. Wilson later writes something similar regarding spontaneous generation and its relationship to sexual generation: “There are two moments of generation, both requiring heat. The concocting of the nutriment can be accomplished by the heat of the environment, and the formation of the spontaneous thing in [GA III.11 762a18-27] requires psychic heat. It is not clear whether the two heats are the same in substance, but they clearly do different things.” (Wilson 2020, 172) Obviously my reading of Aristotle decides the ambiguity at the end of Wilson’s quote here: they are “different in substance,” by which I understand different in kind.

The ambiguity over the difference in the kinds of heat that Wilson articulates is very common, and is a ghost that haunts discussions of *πνεύμα* and *θερμότης ψυχική*. For instance, confusion over the nature of *πνεύμα* closely wrapped up in the fraught discussions about spontaneous generation. Nussbaum refers to it as a ‘hypothetical gap-filler whose workings cannot be scrutinized too closely.’ (Nussbaum 1978, 163) Berryman also refers to Aristotle’s use of *πνεύμα* in locomotion as “compressed, opaque, and unsatisfying.” (Berryman 2002, 96) However, understanding the nature of *πνεύμα* is essential for understanding the transition from non-living bodies to living bodies. While Nussbaum and Berryman are correct in pointing out how difficult it is to understand, my reading of the contrarities of change show that Nussbaum is incorrect in thinking that we ought not to scrutinize *πνεύμα* too closely. Indeed, with the tools I am developing in this dissertation I think that I will be enabled to take a closer look
But what is it about the function of the heat in living bodies that assimilates food that distinguishes it from the heat at work among the changes of simple bodies and their mixtures? Unfortunately, the details of this process are not discussed by Aristotle in his discussion of nutrition in DA II; he simply halts with the fact that food becomes part of the living substance. But for us to understand the contrariety of being and not being part of the body, it is necessary to understand more about the final transformation of digested food into living body. Fortunately, Aristotle does go into greater detail about the transformation of food into the fed thing in PA. Therefore, I will turn to PA to flesh out this theory a bit more.

3.3.2: Blood as digested food

In PA Aristotle says, “Since there is something receptive of all nutrients and generated residues, and the blood vessels are like a container for blood, it is apparent that blood is the final nutrient for the blooded animals, and its analogue for the bloodless.”242 A short span later, he concludes: “For now let this much be said (for so much is useful): blood is for the sake of nourishment, i.e. nourishment of the parts.”243 There are two features of these statements that are worth noting and that reveal the unique character of the post-digestion nutritive mixture (blood etc.) in living things.244 First, it is receptive of “all nutrients” (pasēs trophês). Second, this nutritive mixture is for the nutrition of the parts (trophês tōn moriōn).

Regarding the first phrase, it is important to note that when Aristotle says blood is the “final nutrient for blooded animals” he means that blood is the final cause or product of digestion. This means is that everything that is digested is generated into blood at the completion of the nutritive process. But what is the mechanism of this change? Discovering this mechanism will help us to see why nutrition is distinct from the mechanisms of the simple bodies.

As I noted above, it is clear that for Aristotle heat is a necessary condition for digesting and assimilating food. In the DA he writes: “It is necessary that all nourishment be able to be digested; and what is hot effects digestion. For this reason, everything ensouled has heat.”245 He says something similar in PA, but gives us a little more detail:

(XV) Since everything which grows must take in nourishment, and nourishment is in every case from moist and dry, and the [digestion] (pepsis) and transformation (metabolē) of these things comes about through the potency of hot [tou thermou dunameōs],

at what πνεῦμα is, why the heat associated with it is different in kind from that in non-living bodies, and how it relates to nutrition and reproduction.

It is also notable that in the collection of papers in which Wilson’s article appears (Bartoš and King 2020), several of the papers in section 2 touch upon the ambiguity between the two kinds of heat and provide different answers to that question. My argument, which clearly distinguishes the types of heat into different kinds of heat promises to disentangle some of the worries in these articles.

These issues are not small ones, and they are fraught with many difficulties. I will have to explore the implications of my theory of distinct kinds of changes on the understanding of heat and πνεῦμα at another time. For now it is sufficient to see that my reading may have important implications for those topics.

242 PA II.3 650a33-35.
243 PA II.3 650b11-12.
244 For the rest of this discussion I will be focusing on the nutritive mixture known as blood, since that is the object of the texts we are investigating. However, Aristotle makes it clear earlier in the passage that sap and the equivalent of blood in non-blooded animals operates in the same way. Cf. PA II.3 650a15-29.
245 DA II.4 416b28-29.
owing to this cause if no other all the animals and plants must have a natural origin of heat.  

At first glance these statements make it seem like Aristotle is reducing nutrition to one of the changes allowed by a mixture. But if we look at the elemental composition before and after digestion we can see something odd. First, keep in mind that digestion requires heat as part of the process of change. Second, note that Aristotle does talk about the elemental composition of blood and food in various places. At Meteo. IV.10 389a20, he says that blood is primarily a mixture of earth, water, and air. This roughly gives us the following composition profile: 

\[(C/D)&(C/W)&(H/W)\]_blood. Now let us take as examples three possible foods from our earlier discussion and their composition profiles and compare them with the profile of blood to see before and after a change. The arrow symbolizes “becomes” in the following schemes:

15) \([C/W]_{\text{water}} \rightarrow [(C/D)&(C/W)&(H/W)]_{\text{blood}}

16) \([(C/W)&(C/D)]_{\text{milk}} \rightarrow [(C/D)&(C/W)&(H/W)]_{\text{blood}}

17) \([(C/W)&(H/W)]_{\text{oil}} \rightarrow [(C/D)&(C/W)&(H/W)]_{\text{blood}}

In the diagrams I have left out the living body with which the food interacts and am only showing the elemental combinations before and after the change. What I want to highlight is that in all three of these examples, both before and after the change, the elemental profiles of these bodies are predominantly cold. That means that we have cold material becoming cold material by means of heat. In fact, the same simple bodies exist in potency on both sides of the change, which would be impossible if the same mechanisms of bodily change that we discussed in the last chapter are the only mechanisms at work in this process. For in the changes we observed in mixtures, there is an exchange of contraries such that one body becomes its opposite or an intermediate, and so the same potencies cannot exist before and after the change. What we see instead is that despite heat being used in the process of digestion, the effect of digestion is not the change of the food from a cold mixture to a hot mixture, but rather the mixture stays cold according to composition, even though heat was involved in the change. Aristotle acknowledges as much when he says: “But the underlying subject, i.e. whatever it is that is blood, is not hot.”

A closer analysis of how heat is operating in digestion only highlights the problem. Consider two possibilities for what happens in digestion. First, let us presume that the change is one where the undigested food is becoming hot. This situation would require that the underlying matter in blood should be, according to its elemental composition, hotter. So, we should expect that the living body gives the food heat. But it does not. Instead, the elemental composition does not reflect an exchange of heat and cold, but rather the incorporation of the cold element as it is into the living body. So, the food does not become part of the body by being transformed into a hot element. The cold elements that existed in the food now exists in the blood. Again, that cannot be explained by our simple mechanisms of change, for each of those mechanisms requires an exchange such that when something becomes hot it loses at least part of its cold qualities. But in this exchange there is no loss of cold quality. Therefore, because heat causes the change and

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246 PA II.3 650a2-7.
the new body part retains the cold it had before the change, the process of change that is at work in nutrition must be quite different from the mechanisms we have examined so far.

We may think that the previous point is misleading. After all, if there is an exchange the substance that served as food would be expected to change from being cold to being hot, and that would make the living body colder. In fact Aristotle says that it does just that in De Juv. 6:

(XVI) Everything living has soul, and it, as we have said, cannot exist without the presence of natural heat. In plants the natural heat is sufficiently well kept alive by the aid which their nutriment and the surrounding air supply. For the food have a cooling effect when it enters (as it does for men immediately after a meal, whereas abstinence from food produces heat and thirst.)

In this passage, Aristotle clearly recognizes that, according to the elemental profile the body is made colder. Yet he insists that the living body, both of plants and animals, requires heat. This brings me to the second point. While the discussion in the previous paragraph allows for an explanation of the composition profile of blood after digestion, it does not explain why Aristotle insists that blood is naturally a hot body. But Aristotle does insist on that both in the De Juv. 6 passage and in this passage from PA II.4:

(XVII) With these things determined, it is evident that blood is in a way hot, i.e. in so far as it is what it is for blood to be blood; blood is spoken of just as we would speak of boiling water were we to signify by a certain term.

The natural character of blood’s heat is further reaffirmed later in the same chapter when Aristotle says: “Hence in the nature (en tēi phusei) of such things as well some are hot and moist but when separated solidify and appear cold, such as blood.” Putting aside the comparison with hot water for the moment, we see that Aristotle insists that it is the nature of blood to be hot, and so the body does not become cold in actuality by taking in cold food. Therefore, when the body takes in nutrition through digestion, it does not lose heat but remains hot. This cannot happen on the account of the basic mechanisms of change we have discussed. For Aristotle says that nutrition does not fully incorporate the undigested food, but leaves behind a “residue” (perittōma) in the form of phlegm and the other humors. If change happens according to (G1), (G2), or (C), at least one of the remaining humors would receive the heat from the living body in the exchange that would occur in the change. This would then require the living body to cool. But it does not. So, there is no exchange of its heat for the cold in the food.

Maybe we can explain the change in terms of mixed proportions. Let us presume that there is a larger proportion of hot material in blood than Aristotle leads us to believe. This would allow for blood to take on a certain proportion of cold without actually becoming cold. The problem with this theory is that over time the body should become colder by taking in food, since nourishment supplies matter not just for blood but, through the power of growth, to the rest of

248 De Juv. 6 470a19-25.
249 PA II.4 649b20-23.
250 PA II.4 649b28-30.
251 Cf. GA 725a14-15. Notably, Aristotle does not give a full account of the elemental profile of the four humors. He describes them only in terms of wetness and dryness, not in terms of hot or cold. Cf. HA I.1 487a1-10; Top. VI.3 140b7-15.
the body. If the whole body is augmented with cold material, and if change happens merely as a result of simple quality exchange, we should expect the whole living body to grow colder over time. But it does not. It remains fundamentally hot. Therefore, Aristotle must not think that in nutrition a quantity of hot and cold are exchanged as in the changes we have observed between non-living bodies.

With my reading, we can see that Aristotle insists that blood is essentially hot, but it is apparent that this fact has nothing to do with the potential presence of hot bodies in the compound. If we consider the bodies that are potentially present according to Aristotle’s theory of chemistry, then blood should be essentially cold, not essentially hot, since the majority of its components are cold. But Aristotle knows that blood in actuality is essentially hot. Therefore, the formation of the homeomerous body part, blood, cannot be reduced to the mechanisms of change found in non-living bodies because the heat that characterizes it is not the heat of simple bodies.

Now, I need to note that, confusingly, Aristotle does compare how blood is hot to how boiling water is hot. What makes this comparison confusing is that boiling water appears to be hot only in an incidental sense, and so we might think that blood, too, is incidentally hot even if in actuality it is always hot while in the living body. However, the example with boiling water does not take away from how blood has heat essentially, for the simple reason that in Aristotle’s chemistry the boiling water is also essentially hot, not accidentally hot. “Boiling water” is a mixture of regular water with fire that generates, albeit temporarily, the mixture “boiling water.” The difference between blood and boiling water is that whereas we can understand why boiling water is hot when we consider its elemental profile, there is no clear source of heat in the elemental profile of blood. When we consider the other homogeneous bodies in the living substance, the majority of them are composed primarily of water and/or earth, which should make them essentially cold. But they are not. Therefore, heat has a prominent presence in the homeomerous parts of living bodies that is not justified by the elemental composition of those bodies alone. This means that the essential heat of a homeomerous part is not a result of the ordinary changes in the elemental composition we have examined thus far.

This last fact shows that there is another contrariety at work in nutrition, one that is distinct from the contrarieties that reduce to the mechanisms of the simple bodies. And indeed, it is notable that Aristotle never says that elemental heat causes digestion, he only says that digestion happens “with natural heat” (meta thermotētōs phusikēs), and by “natural heat” I understand him to mean the quality of “hot” found in the elements. Elemental heat is not, therefore, the sole cause of digestion, but acts with the cause of digestion. The power to digest then must be some different power beyond the mechanisms of the simple bodies. Aristotle calls this power the power of nutrition. This conclusion is reaffirmed in Aristotle’s DA. He writes:

(XVIII) The nature of fire seems to some to be without qualification the cause of nourishment and growth, since among bodies fire alone is evidently something which is nourished and grows. On this basis, one might suppose fire to be what accomplishes this in plants and animals. It is, however, a sort of co-cause, and most surely not a cause without qualification; the cause is, rather, the soul.

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252 PA IV.3 650a13-14.
253 DA II.4 416a9-15.
This passage confirms that the soul is the principal cause of nutrition, not the elemental heat. But what is the contrariety and the mechanisms that the soul uses to take in nutrition and impart a new “vital” heat? We will examine that question in the next section.

3.3.3: The distinct character of the vegetative powers

The mechanism that the power of nutrition uses to assimilate foods is what points to the existence of a new kind of contrariety, and therefore a new kind of power, one that comes from the soul. But this only tells us about what the vegetative soul does that is new; it does not tell us what is definitive of the vegetative soul. As Aristotle says, “It is necessary for the student of these forms of soul first to find a definition of each, expressive of what it is, and then to investigate its derivative properties, etc.” Having examined a proper activity of soul and its object, we now must approach its definition and then examine the rest of the powers and properties associated with the vegetative soul.

From our examination of blood, we can describe what is distinctive about nutrition, and the other vegetative powers, as the fact that it takes in the matter without a change in its form. What do I mean by this? In non-living bodies, the composing matter consists of the elements or simple bodies, and the form is the ratio (logos) of the presence of these bodies in the mixture. This ratio determines the sorts of potential and actual qualities the mixture has, and when that ratio changes so do the potential and actual qualities. In nutrition we see that the elements are taken into the living body in the same ratios as they pre-existed in the food, but the resulting mixture (i.e. blood) is not defined by these ratios, as it would be in case of changes resulting from (G1), (G2), and (C). In other words, the potencies of the food pre-digestion survive the change of digestion, but there are actualities in blood that do not correspond with the ratio of simple bodies that compose blood. Specifically it is the quality of heat that cannot be explained by the underlying mixture. What is more, it is the quality of heat that enables blood to perform its proper function within the body that of providing nutrition to the whole body and each of its parts. If we examine why that is, we will be able to see what is distinctive about the soul as a form, and in the process we will identify the novel contrariety behind the change at this fundamental level of soul-activity.

First, let us call to mind three commitments that Aristotle holds. (1) The definition of heat from GC: “Hot is that which associates things of the same kind.” (2) The fact that living bodies are “organic.” The differentiation of parts of a living body into organs requires that these parts have different elemental compositions. (3) That blood “is for the sake of nourishment, i.e. nourishment of the parts.” Given these three commitments, if we were to consider only the elemental composition of each of the parts, it would seem that blood should not be able to interact with, and give nutrition to, each of the parts. Why? Well, if it were hot in the elemental sense, blood would only interact with homeomerous bodies that are like itself or that it can make like itself. But other parts of the body clearly have different elemental profiles from that of blood. Therefore, if blood were hot in the elemental sense it would not interact, not to mention

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254 DA II.4 415a14-16.
255 “That it is necessary to have either blood or something with the same nature as it, and what the nature of blood is—one should also study the causes of this by first making distinctions about hot and cold. For the nature of many things is referred to these origins.” (PA II.3 648a19-24)
257 PA II.3 650b12-13.
feed, other parts of the living body. But given that blood provides nutrition to the whole body and that it is hot, there must be a likeness that all the body parts have that is not reducible to their elemental compositions. This likeness can only be provided by the soul, which brings together diverse homeomerous bodies into one and the same substance. With this in mind, we can see the unique character of living heat that distinguishes it from elemental heat. Like elemental heat, living heat governs interactions between like bodies. But the likeness that determines the interaction of living heat is not a likeness in elemental profile, but a likeness between parts of a larger whole. To put it another way, elemental heat causes an interaction between like wholes, whereas living heat causes interaction between diverse bodies that are alike in being parts of the same whole.

This understanding of living heat now makes it clear why the living body can receive cold elements without losing its proper heat. What living heat does in nutrition is to take cold material that is like to the elemental profile of the living body but is not yet part of the living body and then makes the digesting food part of the whole that is the living body. Once made into blood, the blood can then interact with other parts of the body with the matter taken in through nutrition because blood is like the other body parts in substance and has the living heat that enables it to interact with those other body parts.

Our discussion of food and blood shows that there is a close connection between nutrition and growth. Growth is the power that enables a body to increase by the addition of material like itself. Because blood is like all other parts of the body due to the form of the soul, it is able to increase the various parts of the body by adding material to a part that is like the elemental potencies found in each part. Whereas nutrition makes foreign matter like unto the matter of the living body, so growth makes the parts of a body increase by distributing that nutritive material to parts that are materially unlike but formally like one another. So, the power of growth is a natural corollary power to the power of nutrition.

Aristotle also insists that reproduction is of the same kind of power. Though the connection is intuitively obvious, Aristotle makes it theoretically clear in how he describes the role of heat in reproduction. He does not go into details about reproduction in the DA, but he does have a discussion of reproduction that is consistent with what he has said about nutrition and growth in De generatione animalium. Note the following passage:

(XIX) All have in their semen that which causes it to be productive; I mean what is called heat.* This is not fire nor any such force, but it is the breath (pneuma) included in the semen and the foam-like, and the natural principle in breath, being analogous to the element of the stars. Hence, whereas fire generates no animal and we do not find any living thing forming in either solids or liquids under the influence of fire, the heat of the sun and that of animals does generate them.

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258 “Since the same capacity of soul is both nutritive and generative…” (DA II.4 416a19-20)
259 GA II.3 736b33-737a3. I have placed a * after the word “heat” because I have changed the Oxford translation, which gives “vital heat.” While the notion of vital heat is helpful and very likely what I have been labeling “living heat,” nevertheless the word that Aristotle uses is θερμόν, θερμότης ψυχική which is what we normally translate as “vital heat.” However, I do think that Aristotle is, indeed, discussing living heat and so as an interpretation of the term, the translation is not wrong.
Here he indicates that the heat active in semen is distinct from the heat that comes from a hot homogeneous mixture. He associates this heat with a *pneuma*, a life breath. The difference between elemental heat and pneumatic heat is that this pneumatic heat allows for the generation of animals, whereas elemental heat does not. Why? Because the pneumatic heat brings together diverse bodies and makes them one substance. Consider what Aristotle writes later in the same chapter:

(XX) Now semen is a residue and is moved with the same movement as that in virtue of which the body increases (this increase being due to subdivision of the nutriment in its last stage). When it has entered the uterus, it puts into form the corresponding residue of the female and moves it with the same movement wherewith it is moved itself. For the female’s contribution also is a residue and has all the parts in it potentially though none of them actually.

The motion involved in reproduction is the same kind of change that is involved in nutrition and growth. The difference is that whereas nutrition and growth make foreign material to be informed by the soul, the power of reproduction takes two distinct homogeneous bodies, foreign to one another (seed from the father and blood from the mother), and joins them together into one living being. This joining power of pneumatic heat makes it easier to understand why Aristotle says that in the process of generation the life-principle (*tē archē tē psuchikē*) is “enclosed” in the living body. There is in all these powers a unification brought about by the soul, but where nutrition and growth are ordered towards an increase in the self, reproduction is ordered towards an increase in the species.

What characterizes the vegetative powers is that they all cause interaction between, and in some cases join together, distinct homogeneous bodies into one organic whole without losing the individual elemental profiles of the distinct homogeneous bodies. The existence of such powers does not, of course, exclude the normal operation of the mechanisms of change found in simple bodies and non-living mixtures. In fact, Aristotle often explains the activities of the various organs with reference to the potential presence of the elements that compose them. But these powers and mechanisms are not the only powers at work in living things. There is a new

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260 He also likens it to the stars, but that likeness need not detain us here. For an interesting discussion about the likeness between *πνεῦμα* and the heavenly bodies, see Thein 2020, 182-201.

261 *GA* II.3 737a19-24.

262 Cf. *GA* III.11 762a24-27.

263 My understanding of pneumatic heat may also shed light on the mysterious subject of spontaneous generation. In his article on the subject, Wilson indicates that in the various classical *loci* for spontaneous generation he can identify 4 kinds of heat: “From the *Mete*, we get (a) the destructive external heat that causes putrefaction, and (b) the internal heat that is fugitive from putrefaction. From *GA* III.11 we get (c) the heat that concocts the putrid residue, and (d) the heat that builds that residue into an animal.” (Wilson 2020, 160) I think we can identify (a) and (d) as actions of living heat and (b) and (c) as actions of elemental heat. His argument depends upon a complicated analysis of several texts. Because of the complicated nature of this discussion, I am not going to enter into a discussion of it here. I only want to indicate that if, indeed, spontaneous generation occurs because heat encloses diverse putrefying bodies and makes them one body, and that this is a pneumatic heat, then that is clearly the same action as that of the novel kind of heat I am discussing here. That would make spontaneous generation generally consistent with Aristotle’s views of living-body generation. Consistency with Aristotle’s views on generation is a prominent problem in the consideration of spontaneous generation, so an investigation that connects my view of living heat with the heat that brings about spontaneous generation would be significant. Unfortunately, I cannot engage with that problem here but I hope to do so in the future.
kind of contrariety found in living things, where different homogeneous bodies move from being different bodies to being the same body. The vegetative powers operate along the continuum of this contrariety, either by making foreign bodies part of the self (nutrition and growth) or by joining together bodies foreign to one another into a new individual whole (reproduction).

3.4: Some consequences about the primitiveness of matter

My reading of the distinction between elemental change and the changes effected by the vegetative soul is not so much unique in the conclusion (that the vegetative soul has powers that are not reducible to its material composition), but is unique in that I identify a reason why Aristotle should think that the soul acts in a distinct way. I have shown that if we properly understand the mechanisms of change common to non-living bodies, both simple and mixed, we will see that we cannot explain the types of change unique even to such living bodies as plants. Both my examination of the mechanics of non-living change and of the nutritive power has the benefit of bringing greater clarity to an issue in Aristotle’s philosophy of biology that Jessica Gelber has identified.

Gelber identifies a general consensus in scholarship about Aristotle’s biology, which holds that Aristotle uses the “facts” about the material composition of body parts as explanatorily basic for at least some aspects of their function.264 This claim is characteristically expressed by Lennox: “In the explanations we will be examining, there are certain features of living things that are sufficiently explained by reference to their material natures; and there are certain material facts about certain kinds of animals that are as explanatorily primitive as are other facts about their living functions.”265 In a 2015 paper, Gelber argues effectively against this consensus. I think that my conclusions in this chapter provide independent support for her thesis and fill out something that is lacking in her argument, namely why it seems initially appealing to consider the elemental composition of body parts to be explanatorily basic despite being not true. I want to finish this chapter by unpacking why Gelber is ultimately correct in her analysis.

First, let us examine what Gelber is rejecting. She describes the position in the following way: “I gather that their thought is that the material nature of a kind not only makes positive contributions, but that these contributions are completely “independent” of form in the sense that the presence of the matter is not explained or caused by form. If form explained why that matter is present, matter would not be contributing independently, but rather would be dependent on form.”266 This formulation of the opposing position shows that her rejection of the primitiveness of matter is not a rejection of the idea that the material elements are basic and therefore are still active in living bodies. Rather, she is rejecting that there are two independent sets of explanation, where “some explanations proceed from form or soul and some proceed from matter.”267 What she needs to show is that the causal efficacy of the elements is not, in fact, an independent set of explanations.

Gelber motivates her argument by pointing out the lack of charity in the scholarly consensus. If indeed Aristotle thinks that the elements are explanatorily basic, then he is

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265 Lennox 2001(b), 183.
266 Gelber 2015, 46-7, fn.2.
267 Gelber 2015, 57.
inconsistent because there are passages where he seems to say just the opposite.\textsuperscript{268} She gives three initial reasons for why we should not accept such inconsistency just yet.\textsuperscript{269} As in my own examination, she first tries to prove her position by using the example of blood as a mixture of the elements. She thinks blood is a good candidate for the consensus position because it “is constituted by a particular combination of elemental powers, [and] differences in blood are due to differences in the proportions of the elemental powers compositing it, that is, by its \textit{krasis}.”\textsuperscript{270} She remarks that this \textit{krasis} determines what kinds of body will be food for an organism.\textsuperscript{271} However, she says that even in the case of blood the elemental mixtures are not explanatorily basic if one accepts the following principles:

\textbf{P}: If X is said to be present for the sake of Y, then X’s presence is explained by Y.\textsuperscript{272}

Gelber then provides numerous examples, both with respect to blood and with respect to other homoeomerous mixtures, where Aristotle explains the elemental profile as being present for the sake of the organism.\textsuperscript{273} She says, “Each level of bodily composition is said to be for the sake of the one above. . . . Thus, if we accept principle P, Aristotle’s discussion in \textit{PA} II.1 gives us grounds for thinking that a kind’s \textit{krasis} is not primitive.”\textsuperscript{274}

Gelber also gives an argument not dependent on \textbf{P}. In that argument, she notes that if the \textit{krasis} of a body were explanatorily basic, then explanations of why a particular bodily \textit{krasis} is fittingly paired with certain soul activities is also unexplained: “That the two facts are coordinated so well—that is, that the material composition is conducive to some part of the essence—would turn out to be due to chance.”\textsuperscript{275} This is clearly at odds with the way Aristotle explains the fittingness of certain bodily mixtures for particular activities. Ultimately, Gelber concludes that while the elemental profile is a source of change in a living being, it does not operate independently of the form/soul, but is part of the essence.

My reading of Aristotle helps in her project first by providing another reason for why we should think that the \textit{krasis} of blood and other homoeomerous bodies do not act independently of the form. If this were so, then we would expect nutrition to be reducible to the kinds of change characterized by (G1), (G2), and (C). Yet, as we have seen, this is not the case. Not only does the body take in cold material without losing heat in the exchange, if we were just to consider blood according to its elemental profile, then we should expect it to be cold. Yet it is hot. On my view, not only are the elements not independent causes from the soul, but their normal powers of operation are in some circumstances suppressed.

My view can also further the explanation for how the elements play into causal explanations in living things, albeit in a different way from Gelber. She says the elements play a

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\textsuperscript{268} Cf. \textit{PA} I.5 645b14-20.
\textsuperscript{269} “First, there is evidence that those putative unexplained facts about degrees of heat, dryness, and fluidity, etc. are, in fact, explained. Second, there are certain cases, such as human intelligence, where Aristotle seems to think there is a causal explanation proceeding from facts about matter, but which we have good reason to doubt are intended as proceeding from a primitive fact. Third, the idea that facts about matter are as explanatorily primitive as facts about form requires a particular conception of the causal process that the explanation mirrors.” (Gelber 2015, 48)
\textsuperscript{270} Gelber 2015, 49.
\textsuperscript{271} Gelber 2015, 50. She cites \textit{HA} VII.2 589a8-9 in support of this claim.
\textsuperscript{272} Gelber 2015, 50.
\textsuperscript{273} \textit{PA} II.1 646b5-8 and 23-25; II.8 653b22-24; IV.12 693b11-13 and 693b27-694a4; \textit{Meteo}, IV.
\textsuperscript{274} Gelber 2015, 53.
\textsuperscript{275} Gelber 2015, 55.
causal role because Aristotle envisions the body as a “tool” or instrument of the soul. This makes the body a “co-cause” with the soul; just like a hammer causes the building of the house along with the builder, so the body causes things along with the soul. But there is a flaw in this argument. This explanation may seem acceptable with active powers, but not with passive ones. For instance, it is a hard sell to think that when the body is burned by fire that the soul is using the body as a tool for being burned, and therefore the soul is a co-cause of being burned. What is more, her explanation of body-as-tool gives too much actual existence to the elements, thus allowing for some independence. Ultimately, my objection to her answer is that it does not fully explain how the powers of change in bodies are essential to a living being, something which Gelber insists on, rather than coordinating with the living being. But my explanation for how the elements are potentially present in mixtures works just as well in the case of soul. While the soul may have potencies not reducible to the elemental profiles, nevertheless as a form of a body, the soul will have, in its essence, the potencies of body along with the vegetative powers. The body is not so much an organ, but composed of organs that have all the potencies naturally associated with their individual elemental profile. The soul’s ability to unite these diverse bodies together, while unique, entails that it is a body, and therefore has all the elements and mixtures of bodies in potency, if not in actuality.

I consider this a friendly amendment to Gelber’s overall argument. With my reading of Aristotle, there is an even stronger argument for against the consensus view of the independence of the material’s causal efficacy.

3.5: Conclusion

What we have seen here is the real distinction between changes initiated by non-living bodies from those of living bodies. Non-living bodies are mixtures, and when change results from the interaction of two bodies it is a result of the predominance of either cold, heat, dryness, and wetness. The new substance that is generated has as its matter a particular elemental profile and the ratio of that profile is its form. Living things, however, are not defined by their elemental profile. In fact, they are composed of at least two distinct homogeneous bodies with different elemental profiles. The soul unifies the parts into one substance and we can observe the unity of substance because of the nutritive powers. The nutritive powers interact with mixtures of diverse elemental profiles and incorporates them into the ensouled body, making that previous unlike mixture like unto itself. In this way, it takes the matter of mixtures it interacts with, but not the form. Living things also use this power to grow, by distributing nutrition appropriately throughout the body. Lastly, reproduction is possible by joining together two distinct homogeneous bodies so that they become one entity rather than continuing to be two different mixtures.

With this distinction in hand, we can see that Aristotle has a clearly defined difference between living and non-living bodies, and that the soul is the form that determines the essence of the living body. But this is only one kind of soul. Aristotle distinguishes two others kinds of soul that have different powers, namely the sensitive soul and the intellective soul. In the next chapter

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277 “This alternative can accommodate the fact that the matter of a living organism is in a sense its nature, insofar as it is a source of change and rest that belong non-accidentally. And this picture also allows for certain features of living organisms to be formed “of necessity” because of the interactions of the material elements.” (Gelber 2015, 57)
we will carefully examine what is peculiar about the sensitive soul and see how its powers differ in their operation from the vegetative soul, and thus see why Aristotle considers the sensitive soul different in kind.
Chapter 4: Distinguishing the Sensitive Powers from the Vegetative Powers

“For what Strattis said in deriding Euripides is true, ‘When you make pea-soup don’t put perfume in it.’” *(De sensu 5.443b30-31)*
4.1: Introduction

In the previous chapter we examined the principal difference in the way that living bodies change as compared to non-living bodies. Among non-living bodies, the changes themselves are determined by the elemental profile of the interacting bodies. But the result of a change in living bodies is not determined by the elemental profile. Instead, the living body integrates individual homogenous bodies into a single whole composed of diverse homogeneous parts. In the case of nutrition, the elements of the food receive the form of the organic whole. In the case of growth, the various homogeneous parts increase in bulk and quantity. Reproduction brings together two or more diverse homeomerous parts and generates a new organic substance. In all of these powers we see that the living body makes unlike things into one substance with unlike parts. With this in mind, we can say that for Aristotle the living being is able to receive and impart matter without receiving a new substantial form or losing its substantial form. In other words, living things can receive matter without form.

In this chapter, I am tasked with our first distinction among living bodies: the distinction between the powers of the vegetative soul and the sensitive soul. When Aristotle discusses the nature of the sensitive powers, he explicitly says that the senses receive the “form without matter.”278 That this ability of sensitive souls is what distinguishes them from plants is clearly stated by Aristotle in DA II.12 and elsewhere. The controversy arises, though, in what it means to receive a form without its matter. Getting a clear picture of what it means to receive form without matter is key, for when we have that clear picture then we will have a clear understanding of the specific difference of the kind of change that Aristotle himself identifies as unique to sensitive beings.

Keeping in mind my examinations of change in the last three chapters, in the present chapter I will provide what I consider to be the correct meaning of the phrase “to receive form without matter” by an examination of the mechanisms of change involved in sensation. I will begin by examining the difference between first and second potency, which is an important distinction for understanding sensation and how it differs from the vegetative powers. Then I will use that distinction to talk about how sensitive potentiality is not subject to alteration (alloiōsis) in the usual sense of the term. Once I have outlined my own views on these subjects, I will then proceed to examine three general positions on what type of alteration is occurring in sensation, often portrayed as a division between literalist and spiritualist views, with a number of scholars also identifying a so-called “middle” position.279 After examining these views, I will argue that the spiritualist position, properly understood, is the correct view of how change in sensation works. With these tools, we will be better able to understand what it means to receive a form without matter. With that distinction clearly in mind, we will be able to identify the novel contrariety at work in the sensitive powers that makes the sensitive powers different in kind from the vegetative powers.

278 “It is necessary to grasp, concerning the whole of perception generally, that perception is what is capable of receiving perceptible forms without the matter, as wax receives the seal of a signet ring without the iron or gold.” (DA II.12 424a17-21)
279 Richard Sorabji and Stephen Everson are examples of the literalists views. Myles Burnyeat and Thomas K. Johansen are examples of the spiritualist views. Victor Caston and Mark Johnstone are examples of the middle positions.
4.2: The potency of sensation

4.2.1: Sensation as a motion and a second potency

We will begin our examination of Aristotle’s theory of sensation where he begins: with an examination of the different kinds of potency in DA II.5. In this examination of Aristotle’s theory of sensation, I want to follow his argument closely, which will mean that we must cover some well-traveled ground. I think it is important to review these arguments because they are part of the more general argument that he uses to distinguish how the changes involved in sensation differ from the modes of change we have already discussed. This review will help us to see the overall flow of the argument and how my understanding of intermediates sheds light on the character of second potency and actuality. So, in this first part of our examination, I ask the reader to be patient with the initial general review, knowing that I will also be using the notion of intermediates developed in the last three chapters to dive deeper into the meaning of second potency.

Aristotle begins his discussion of sensation in DA II.5 with a preliminary definition of it. He writes, “Perception arises in both being moved and being affected, just as was said; for it seems (dokei) to be a kind of alteration (alloiōsis tis).” Aristotle describes sensation in exactly the same way in DA II.4: “Perception seems to be a sort of alteration.” Aristotle’s use of “seems” (dokei) with the verb in the infinitive can be a way that he expresses a standard view among his contemporaries. His use of tis (understood in the sense of “sort of”) hints that he will argue that sensation is not an alteration in the proper sense of the term. But, as is his custom, he begins here with the standard view as a place to start his investigation while indicating that he will diverge from it later. Aristotle, then, begins the process of understanding this definition with a pointed question: why is there no sensation of one’s own senses even though they are composed of the same primary elements as the objects of perception? This question indicates to us that the material composition of the object of perception is not sufficient for causing perception, because otherwise we would perceive our own senses. The externality of its object is, of course, not unique to the objects of perception. Nevertheless, Aristotle rightly emphasizes the fact that sensation requires an external object to operate so that we will wonder what it is about sensation that necessitates that the object be external to the sensing body. Aristotle uses this observation to remind us that the powers of sensation are not things “in actual existence” (ouk estin energeiai) but in “potential (dunamei) existence.” Again, this is not unique to the powers of sensation, but it does set the stage for a discussion of potential existence, which will play an important role in his discussion of sensation.

This construal of the faculty of sensation as having potential existence is key for understanding Aristotle’s theory of sensation and how it differs from the vegetative powers of soul. We should note that this kind of potential existence is distinct from the way that the matter of the elements exists potentially in living and non-living bodies. For the latter potency is related to the ability of a given body to become something new by interacting with bodies that have the appropriate actual contrarieties. But the potency described in sensation is not a potency “to become” in the sense we have been discussing up until this point. It is the use of an ability already possessed. To understand the unique features of sensation, we must first understand this...
different way of being in potency, and then how that translates to receiving forms by means of that new kind of potency. What we will see is that this potency allows for an interaction between bodies without generation and corruption. It is in these types of interactions that we will discover the unique way the senses receive forms without matter.

DA II.5 is where Aristotle begins to examine the nature of sensation. The primary aim of his discussion at this point is to distinguish two kinds of act and potency, what the later tradition has called the difference between 1st potency and 2nd potency, and 1st actuality and 2nd actuality. He describes sensation as a kind of 2nd potency, and the notion of a 2nd potency is crucial for understanding the nature of sensation. That sensation is a kind of potency rather than an actuality is evident from the fact that we need an external object to be present in order to sense. As Aristotle notes, “for this reason [a sense] does not perceive [when there is no external object], just as what is combustible does not burn by itself without something capable of burning it. For otherwise it would burn itself, and would have no need of any actually existing fire.” This passage is simply stating that in order to perceive, we need an external object with which to interact. Otherwise, we could sense at will, without the need of an object of sense being present. But it seems to be the case that we only sense something in the presence of the particular object we are sensing. This need for an interaction with an external object proves that sensation is a sort of potentiality, not a sort of actuality.

Proceeding in his investigation of sensation, Aristotle then introduces a familiar question that he examined in the Physics and in DA I: does the interaction occur between things that are alike or things that are unlike? The answer is, of course, both: “for something unlike is affected, but once affected it is like.” This is familiar territory. However, in this discussion Aristotle introduces something new about sensation. In previous discussions about the interaction between objects where one is in act and the other in potency, there was always some sort of generation and corruption, whereby something unlike becomes like unto the subject that is assimilating it. Sensation is different. It is more like what Aristotle calls a “motion” (kinēsis), but a motion that does not end with the moved object becoming what was moving it. In fact, Aristotle’s discussion of sensation in DA II.5 has some important similarities with his discussion of motion in Phys. III. For in DA II.5 perception is labelled an “incomplete” (atelēs) actuality just as motion is labelled an incomplete actuality in Phys. III. This similarity in language is important to consider, for only in Phys. III does Aristotle give us an extended discussion of motion. Since he considers perception a kind of motion, and motion as such is most extensively discussed in the Physics, then to understand better the nature of 2nd potencies it will be helpful to consider what Aristotle has to say about motion there.

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282 DA II.5 417a8-10. The brackets indicate text I have added for the sake clarity, but is not translating something in the Greek.

283 Aristotle does remark that we can seem to perceive objects when we dream, but that this is not perception properly so-called, but is rather an image. Cf. On Dreams 1 458b3-25.

284 DA II.5 417a20-21.

285 Cf. DA II.5 417a16-17; Phys. III.2 201b31. I should note that while the word κίνησις, often translated as “motion,” does include the idea of locomotion, it nevertheless has a much broader meaning, and can sometimes include the notion of “change” in general. In fact, in Phys. III Aristotle sometimes talks about κίνησις and μετάβασις when making a general point about change vis-à-vis act and potency. Cf. Phys. III.1 200b12; 201a1-2; 201b18.

286 I say that Aristotle “only” gives us an extended discussion of motion in Phys. III because the discussion in Met. XI.9 is almost word for word the same as the Phys. III discussion, and seems to come from that earlier text. I will leave the “almost” part of that last sentence for manuscript editors and textual commentators to worry about.
Let us consider this idea of “incompleteness” for a moment. In the previous three chapters, we have talked about “incompleteness” in terms of intermediates. Within a species of change, the extremes are “complete” contraries, whereas the intermediates are “incomplete.” As we discovered in the discussion of intermediates in chapter one, intermediates are incomplete because the specific difference contains a proportion of the extremes as part of its essence, and so to understand an intermediate form one must understand how it is essentially related in a proportional way to the extreme contraries. I think that this notion of incompleteness in intermediates is the same notion of incompleteness at work in the definition of motion. What is more, it is the incomplete and intermediate character of motion that allows for interaction without generation or corruption. The claim that the notion of incompleteness at work in motion and in the actualization of a 2nd potency is the same notion of incompleteness at work in intermediates may surprise my readers. But a careful examination of the text of the Physics will prove my point. What we will see is that the essence of any motion requires a reference to the origin and end of the motion just as the essence of an intermediate property requires a reference to both extremes.

In Phys. III.1 Aristotle gives two definitions of motion. Here is the first: “The actuality of what is potentially, qua potential.” The second definition is slightly more specific: “The actuality of what is potential when it is already actual and operates not as itself but as movable.” In the second definition, movement is depicted as a kind of halfway reality between total deprivation of a property and total having of a property, and it is clear that the second definition is a clarification of the first, more obscure, definition. This kind of incompleteness is exactly parallel to the kind of incompleteness we saw in intermediate qualities and mixtures. Movement is neither fully what it will become nor is it fully unlike what it will become, but is some intermediate state of being.

We also learn that movement is not directly related to the essential form of the objects involved in motion. Rather, motion is an intermediate property between non-essential powers. That Aristotle has this understanding firmly in mind when discussing motion is obvious upon examination. In the Physics passage immediately following the second definition of motion, Aristotle clarifies what he means by “as (hēi) movable.” He distinguishes it from the actuality that occurs at the end of a generation or corruption. He illustrates his point with the example of how bronze becomes a statue:

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287 To clarify, it is not surprising that motion is incomplete, but that I am claiming it is incomplete in the way that intermediates are incomplete. This should be a surprise because it is contrary to notion of incompleteness in the widely accepted view of motion as a “constitutive actuality,” most prominently proposed by L.A. Kosman in his seminal 1969 paper on the definition of motion. There Kosman says, “the sense in which motion is incomplete, then, is the sense in which it is atelēs in the literal sense, i.e. in which it does not contain its own end but is directed toward an end outside itself.” (Kosman 1969, 57) Anagnostopoulos calls this the “consensus view” on motion and both Polansky and Shields seem to take it as a given. Cf. Polansky 2007, 228-9; Shields 2016, 216-17; Anagnostopoulos 2010, 34. However, my claim here will also be surprising to the principal rivals of the consensus view, two of whom are Kostman 1987 and by Charles 1984, 19-20. I am not going to address these differences here. There is a substantial literature on the definition and nature of motion, and my views on intermediates and incompleteness do have strong implications that will enable me to carve out a unique position in that constellation of views about motion. However, the precise implications of my views on the theory about Aristotle’s motion will have to wait for a least a separate paper, possibly a monograph, all its own. All that I need the reader to see now is that my view on contraries and intermediates does shape my interpretation of Phys. III.1-3, and that this has direct implications for my theory of change in living things.

288 Phys. III.1 201a9-10. I have slightly modified this translation and the next.

289 Phys. III.1 201a27-29.
Bronze is potentially a statue. But it is not the actuality of bronze as bronze which is motion. For to be bronze and to be a certain potentiality are not the same. If they were identical without qualification, i.e. in definition (kata ton logon), the actuality of bronze as bronze would be motion. But they are not the same, as has been said. (this is obvious in contraries [epi tôn enantiôn].)

On the surface, this passage appears to have a straightforward reading. It seems apparent that what it means to be something in potency is different from what it means to be something actually. But notice that Aristotle’s aim is to separate the potency of motion from the essence (logos) of a thing, including from the potencies that are proper to the essence. Bronze does have a potency kata ton logon (i.e. an essential potency), and that is the potency to not be bronze, which is different from the potency to be a statue (an accidental potency). When the essential potency is actualized, the bronze corrupts and a new substance comes into being. As Aristotle remarks, this is obvious when we consider the contraries. But when we consider a motion related to bronze, say being sculpted, we see that the motion is an intermediate between two qualifications (i.e. accidental properties) of bronze, namely being a statue and not being a statue. The actualization of being sculpted cannot be understood without reference to the contrariety of not being a statue and being a statue, which are first actualities of bronze, but actualities that are not essential to bronze itself. Bronze can only be sculpted when it is neither not a statue (i.e. in no sense a statue) nor a statue in the complete senses of those properties. Rather the bronze must be some proportion of being and not being a statue while it is being sculpted. Aristotle says something similar with regards to building a house: “The actuality of the buildable as buildable is the process of building. For the actuality must be either this or the house. But when there is a house, the buildable is no longer there. On the other hand, it is the buildable which is being built. Necessarily, then, the actuality is the process of building.” It is this strange fact, that the full actuality of a potency for motion just is the state between two kinds of first actuality, which makes the motion a proper intermediate. But this feature can be overlooked if we think that the first actuality that gives rise to the motion is the actuality of the substance, which is the intuitive first reading of this text. While motions are ultimately grounded in the actualities of substances, the proximate first actualities that make motion possible are not actualities related to the essence of the substance, but to its accidental features.

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290 Phys. III.1 201a29-35.
291 By “having some proportion” of being a statue, all I mean are stages in sculpting where it is unclear whether it is or is not the statue being sculpted. So, when the lump of bronze is shaped into a statue of Mercury, and it has been given proper human dimensions, it is not a statue but literally has the proportions of the statue it will be. Likewise the face can be sculpted but not the eyes, or the hand can be sculpted, but not the finger nails. These are all examples of different proportions of the statue’s development. That being said, my explanation likely shows an extreme lack of knowledge of what it means to sculpt bronze into a statue. I beg pardon from experts on the matter.
292 Phys III.1 201b7-13.
293 Hussey expresses this intuitive reading and the problem generated from it thusly: “If the potentiality is expressed by ‘being potentially F’ then the actuality consists in just actually being F. This will work in the case of ‘changeable’, provided this is read as ‘potentially in process of change’ and not as ‘potentially having changed’. But it will not work in the case of ‘potentially being’, since this can only plausibly be expanded to ‘potentially being F’ where ‘F’ gives the end-state. And the fact that this is the only plausible reading casts doubt on the reading of ‘changeable’ as ‘potentially in process of change’, since the version of a27-9 is clearly meant to be a mere rephrasing. So we must, it seems, understand ‘changeable’ at a29, and the corresponding potential words at a12-15 (‘what admits of qualitative change’ etc.), on the model of ‘potentially having changed.’” (Hussey 1983, 59)
Here is how this theory of motion applies to sensation. Aristotle says in Phys. III that there is a distinction between color and the visible: “We can distinguish, then, between the two—just as color (chrōma) and visible (oraton) are different, and clearly it is the actuality of what is potential as potential that is motion.”294 The first actuality is the color. Grounded in the actuality of a particular color are two potencies: (1) the potency to become another color and (2) the potency to be visible. Potency (1) is related to the logos of color itself, but the potency (2) is a property related to the logos of the substance in which the color inheres. Perception will not be a motion between being and not being a color, but in the being perceived or not being perceived of said color, whatever this property turns out to be (Aristotle is vague about that property). The key is that the formprivation contrariety between which the motion is an intermediate is something other than the logos of the form that grounds it.

One might object to this reading of the Phys. III passage considering that in DA II.7 Aristotle discusses the possibility that something can be visible without its “proper color” being visible. He writes:

(II) It is not the case that all visible things (orata) are in light; rather, only the color proper to each thing is. For some things are not seen in the light, but produce perception in the dark, for example, things appearing fiery and glowing (there is no name for them), for example mushrooms, horn, and the heads, scales, and eyes of fish; the color proper to none of these is seen.295

The fact that something could be visible without its proper color would be enough to distinguish the two properties. However, the point of the Phys. III text is different than the DA II text. The Phys. III text is not trying to distinguish the two properties but to distinguish the potential for motion from the actual property that is the subject of the potency for motion. In the passage immediately preceding the one we are discussing, Aristotle notes that the potency for health and illness are predicated of the same subject, whether that be moisture or blood.296 Likewise, in the DA II.7 passage the distinction between the visible and color is such that “to be visible” is a property of an object that is a necessary condition for the potency “to be” or “not to be” a particular color. Therefore, one can be visible without light but cannot be a particular color without light. What is more, in the DA II.7 passage Aristotle does not say that objects that are visible without color are colorless, but only that their “proper color” (to oikeion chrōma) is not visible without light. This, of course, suggests that even these visible objects do have a proper color that makes visibility possible even if the color itself is not seen.

But there is more to motion as a 2nd potency that differentiates it from a 1st potency than being outside the essence of the subject of motion. Before noting that difference, let me first identify two similarities. As the Phys. I.5 argument requires, the change of motion requires contraries or their intermediates as relata of change.297 Also, motion, at least as it is discussed in

294 Phys. III.1 201b3-5.
295 DA II.7 419a1-7.
296 Cf. Phys. III.1 201a35-b5.
297 Cf. Phys. III.2 201b23-24. In this passage Aristotle indicates that motion is a change between opposites, but, as we say in our discussion of Met. X, the proper opposites for change are going to be contraries and their intermediates.
Phys. III, is like the previous changes in that there is mutual contact between two bodies. The principal difference in 2nd potencies is that in an interaction between bodies where a 2nd potency is actualized, one body is clearly the agent and the other the patient. However, a further distinction must be made. As we saw in the last chapter, mixtures can interact as agents and patients, and so there are changes in 1st potencies that can be unidirectional too. What is distinct about 2nd potencies and motion is that when the agent and patient interact the agential form remains a property of the agent but nevertheless actualizes a potency in the patient. To put it another way, in the basic changes of (G1), (G2), and (C), a form is necessarily given to the patient, and the agent likewise loses the form, either entirely or to some degree. But in motion, the agent does not necessarily lose the form while it actualizes the patient, at least not while the motion, i.e. the intermediate state, holds. So, the presence of the form in the patient requires the direct contact of the agent with the patient, and when the agent stops the contact the form causing motion stops being in the patient. Why is this the case?

Notice what Aristotle says about this interaction. He writes:

(III) It is the actuality of this potentiality by the action of that which has the power of causing motion; and the actuality of that which has the power of causing motion is not other than the actuality of the movable; for it must be the actuality of both. A thing is capable of causing motion because it can do this, it is a mover because it actually does it. But it is on the moveable that it is capable of acting. Hence there is a single actuality of both alike, just as one to two and two to one are the same interval, and the steep ascent and the steep descent are one—for these are one and the same, although their definitions are not one. So it is with the mover and the moved.

What text (III) shows is that part of the reason why motion requires contact is that there is a double potency, but not like the double potency of the changes previously discussed. In the double potency in chemical changes, each potency is actualized in relation to a distinct actuality. So, in a (G1) change between fire and air, fire has a potency for becoming wet, and is actualized by the wetness of the air, and mutatis mutandis for air’s potency to be dry. But the double potency in a 2nd potency/actuality interaction are rooted in the same actuality, not distinct actualities. Therefore, when the potencies are actualized, they are such by the same activity. The sameness of the activity is essential to highlight because in this case it is not one object which gives an actuality to another, but two objects that share a single actuality. Both agent and patient can be actual without losing their inherent 2nd potencies because neither is giving a form to the other insofar as they are engaging their 2nd potencies.

The point of highlighting these features of motion is to identify that motion is both a different kind of contrariety and a new kind of intermediate. Instead of being an intermediate property, motion is an intermediate state, where a state is an actuality that exists in an interaction but does not exist after the interaction, like a property would. This is an important first step in understanding the difference in kind of the contraries of the sensitive powers. However, this kind of motion is not unique to the sensitive powers. While I did not discuss it in the previous chapter, it turns out that the vegetative powers do have 2nd potencies and can cause motion properly so

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298 Cf. Phys. III.2 202a6-7. Of course, Aristotle does allow for motion without contact, like the motions caused by the heavenly bodies and the unmoved mover. But in the context of Phys. III.2 he is focusing on the kind of motion that is most common to us, which requires contact.

called. To prove the difference in kind between vegetative and sensory powers, I will need to identify the difference between the way the motions of the vegetative powers cause change from the way the sensitive powers cause change. Understanding the general way any motion operates as a change will help us to see the context within which we can identify the unique features of the motions and changes of sensitive powers.

4.2.2: Motion among the living powers

Does Aristotle have the distinctions of Phys. III in mind as he investigates the nature of sensation? Yes. Although the connection between the passages is well known, I want to examine the similarities more closely and highlight particular features so that later in the chapter I can tease out a different interpretation of sensation than the ones on offer. To see that, let us look at a few key texts where Aristotle’s discussion of sensation mirrors his discussion of 2nd potency and motion in Phys. III. In DA III.2, Aristotle describes how a single activity is dependent upon two potencies, one the potency of an agent and the other the potency of a patient. He writes:

(IV) The activity of the sensible object and of the sensation is one and the same (hē autē men esti kai mia), though their essence is not the same (to d’ einai ou tauton autais); in saying that they are the same, I mean the actual sound (psophos ho kat’ energeian) and the actual hearing (akoē hē kat’ energeian); for it is possible for one who possesses hearing not to hear, and that which has sound is not always sounding. But when that which has the power of hearing is exercising its power, and that which can sound is sounding, then the active hearing and the active sound occur together; we may call them respectively audition and sonance.301

Notice that text (IV) is describing the same phenomenon as that in text (III) from the Physics. Aristotle begins this short paragraph by identifying the energeia of two distinct things: the sound and the power of hearing. Both are not always in actuality, and when one of the two is actual, the other must be actual as well, for the actuality of both is the same thing, even if the two things that have the powers to act and be acted upon are not. The agent and the patient are actually different things, and their potencies with respect to sensation are also different things, but the actualization of those potencies is the same, even if that actualization can be understood differently depending on which of the two interactors we refer to. “What is more, Aristotle also explicitly affirms here that the action is a motion that takes place in the patient, which also mirrors the discussion in text (III). He continues:

(V) If then the movement, that is, the acting and being acted upon, takes place in that which is acted upon, then the sound and the hearing in a state of activity

300 Burnyeat notes this connection in Burnyeat 2002, 42.
301 DA III.2 425b26-426a2.
302 One notable difference is in language. In Phys. III the λόγος is not the same, but here the τὸ εἶναι are not the same. As we will see in the next chapter, these are different tokens for the same concept.
must reside in the potential hearing; for the activity of what is moving and active takes place in what is being acted upon.¹⁰²

These two texts together show that, when Aristotle is considering sensation, he conceives of it as a motion and an actualization of a 2nd potency. By understanding sensation as a type of motion in this way, we can apply to it the fact that motions are “incomplete” actualizations, i.e. a way of being actualized without becoming the thing that is imparting the motion. This is partially how we can understand the receiving of the form without the matter.

Is the fact that sensation is a 2nd potency and a motion what differentiates it from the vegetative powers? No. It seems clear that the vegetative powers do have motions associated with their proper activities, which means that they do have 2nd potencies.³⁰³ The clearest example of this is found in Aristotle’s discussion of nutrition. When considering food, he writes: “nourishment is in some way affected by what is nourished, but what is nourished is not affected by nourishment, just as a carpenter is not affected by the matter, but it is affected by him. The carpenter changes only from idleness (argias) into activity."³⁰⁵ Here Aristotle is commenting on the fact that the one nourished (i.e. the agent), when acting on the food, only changes from idleness to activity. The change in form is happening in the food. This line of reasoning sounds odd, but as we noted in the previous chapter, Aristotle makes a distinction between two kinds of food: food before digestion and food after digestion. Food before digestion is different in form from the living body, whereas food after digestion is same in form as the body. What he means in the previous quotation is that the body of the undigested food does not alter the form in the living body, but is altered by the living body in the way that materials for a house are altered by the builder. This is clearly an agent/patient relation, where the soul is the agent and the undigested food the patient. So, the vegetative soul has at least one proper motion and 2nd potency. Therefore, it is not just the fact that sensation is a 2nd potency that makes it a distinct kind of power from those found among the vegetative powers. Aristotle needs a further distinction.

For that distinction, recall the preliminary definition of sensation that Aristotle gives at the beginning of DA II.5: “Perception arises in both being moved and being affected, just as was said; for it seems (dokei) to be a kind of alteration (alloiōsis tis).”³⁰⁶ Aristotle notes elsewhere that there are four categories in which motion can possibly occur: substance, quantity, quality, and place.³⁰⁷ When Aristotle says that sensation is a kind of (tis) alloiōsis, he is indicating that the motion of sensation occurs in the category of quality. The qualification tis, the celebrated tis alienens, is significant.³⁰⁸ The qualification indicates that Aristotle does not think it is an alloiōsis in the usual sense, e.g. as what happens when a living body is qualified in nutritive activity. In fact, as I will argue, Aristotle holds the position that sensation qua sensation is not a literal alloiōsis. This last statement is not an uncontroversial claim on my part and will require that I situate myself within the literalism vs. spiritualism debate about sensation. However, to avoid getting swept away in the flood waters of that debate, I first want to identify what I think the specific difference is between vegetative and sensitive powers with respect to their peculiar

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¹⁰² DA III.2 426a3-7.
³⁰³ However, they cannot cause locomotion. Cf. DA III.9 432b13ff.
³⁰⁴ DA II.4 416a34-b3.
³⁰⁵ ή & αἴσθησις ἐν τῷ κινεῖσθαι τε καὶ πάσχειν συμβαίνει, καθάπερ εἰρηται· δοκεῖ γὰρ ἄλλοιοσίς τις εἶναι. (DA II.5 416b33-35)
³⁰⁶ Cf. Phys. III.1 200b33-34.
motions. Once I have established that, I will have a secure enough footing to explain where I stand in the aforementioned debate.

4.2.3: Sensation vs. vegetative motions

To see why I think perception occurs without an *alloiōsis*, we first must understand what *alloiōsis* is in its basic sense. An *alloiōsis* is a type of change common to both living and non-living bodies. Aristotle lists it as one of the categories of motion. It is normally associated with a change in quality, and is not necessarily accompanied by a substantial change, although it can accompany a substantial change. In *Phys.* I.7, Aristotle presents us with a paradigm example of *alloiōsis*: the not-musical man becomes the musical man. Here there is a change from the privation of the quality “musical” to the having of the quality “musical.” We might also be able to think of the way that the bronze changes from not being a statue to being a statue. This, too, is a qualification of the mineral substance, bronze. With this standard notion of *alloiōsis* in mind, let us consider how *alloiōsis* can happen in terms of the discussion of change I have outlined in the first three chapters. This discussion will help us to see how sensation can be an *alloiōsis tis*.

First, let us reconsider the three basic kinds of change: (G1), (G2), and (C). With respect to the elements, all three of these kinds of change represent a substantial change, in that the exchange of qualities leads to a change in substance. On the elemental level, none of these changes are motions in the proper sense of the term, since Aristotle explicitly excludes generation and corruption from the category of motions elsewhere in the *Physics*. Nevertheless, we can identify some important features of elemental interaction that will characterize *alloiōsis* in motion. The first is that what brings two bodies into these kinds of changes is that they are contrary in their qualities. For example, in a (G1) change, two bodies, say fire (H/D) and air (H/W), interact because they are contrary along the wet/dry contrariety. Second, in the interaction the contrary qualities are exchanged. So, the dry in the fire becomes wet in the interaction and the wet in the air becomes dry. Thus that body that formerly was fire becomes air and vice versa. In this case, the quality exists in the new elements in the same way that they existed in the old elements, and thus why it is that the same types of elements exist after the change, just in different bodies.

All of the last two paragraphs should be review from the previous chapters, but there is one thing we can now add. We have been talking about agent and patient relationships, and we can ask: is one element in the basic changes between elements an agent while the other is a patient? While an argument could be made that there are agent/patient relations in elemental changes (for example, Krizan makes such an argument), nevertheless I think that the mutual generation and corruption make such a designation superfluous, since the circularity of the

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309 Cf. *Phys.* III.1 200b33-201a3.
310 Cf. *Phys.* I.7 190a4-5. This is the example he gives of a complex change. Even though Aristotle does not explicitly label this change an ἀλλοίωσις here, it is nevertheless the complex change is clearly intended to be an example of an ἀλλοίωσις. This is evident elsewhere, for instance at *GC* I.4 319b24-31: Ἐδὲ μὴ, ἔσται ἄλλοιωσις, οἷον ὁ μουσικὸς ἀνθρώπως ἔστηκε, ἀνθρώπος δʼ ἀμουσίας ἐγένετο, ὁ δʼ ἀμουσίας ὑπομένει τοῦ αὐτοῦ. Ἐκ μὲν οὖν τούτου μὴ πάθος ἦν καθ᾽ αὐτὸ ἡ μουσικὴ καὶ ἡ ἀμουσία, τοῦ μὲν γένεσις ἦν ἄν, τοῦ δὲ φθορά: διὸ ἀμουσίας μὲν ταῦτα πάθη, ἀνθρώπου δὲ μουσικὸς καὶ ἀνθρώπως ἀμουσίας γένεσις καὶ φθορά: νῦν δὲ πάθος τοῦ τοῦ ὑπομένοντος. Διὸ ἄλλοιωσις τὰ τοιαῦτα.
311 Cf. *Phys.* V.1 225a20-30. Generation and corruption are not changes because there is a change from non-being to being or from being to non-being, and if this were motion than non-being would be said to move, which is absurd.
change makes both bodies agents and patients with respect to each other, just in different respects. The superfluity of an agent/patient relation is consistent with Aristotle’s view that generation and corruption are not motions. After all, in motion there must be an agent and a patient, since the intermediate character of motion requires that it exist in between a fully actual thing (the agent) and a fully privative one (the patient). In addition, there must be a clear subject in which the change occurs (i.e. the patient), but the motion need not destroy the potency in the patient. Because generation and corruption are not motions, they do not need an intermediate state and a clearly defined agent/patient relation. They simply exchange the appropriate qualities without an intermediate state.\footnote{This does not render the agent/patient distinction a category mistake with respect to these basic changes. After all, in generation and corruption, there is a cause of generation and a thing that is caused to be generated. However, in the case of changes between elements, the labeling of one body as an agent and one as a patient does not do a lot of work for us in helping to understand mutual generation and corruption. This is why I say it is “superfluous” for understanding the change.}

With mixtures the story is different. While mixing does happen in accordance with the basic changes, the inequality between proportionate mixtures does mean that there might be intermediate states. And as we saw in chapter three, some of the changes Aristotle describes in the \textit{Meteorology} do not make sense without an agent/patient relationship. Let us reexamine examples (7) and (8) from last chapter:

\begin{align*}
18) [(C/W)&(H/W)]_{\text{oil}} &\leftrightarrow [H/D]_{\text{fire}} = [(H/D)&(H/W)]_{\text{mixture 5}} \text{ and } [C/W]_{\text{water}} \\
19) [(C/W)&(H/W)]_{\text{oil}} &\leftrightarrow [H/D]_{\text{fire}} = [(C/W)&(H/D)]_{\text{mixture 6}} \text{ and } [H/W]_{\text{air}}
\end{align*}

According to what Aristotle says in the \textit{Meteorology}, (8) should not happen. We can see why Aristotle excludes (8) from the realm of possibility by identifying oil as the agent, and indicating that because oil has the quality “cold,” it will naturally start the interaction with the hot elements in the fire mixture. That being the case, we can see why the act of heating happens in the oil as the patient. The fire, coming into contact with the oil, gives its heat to the oil. This heat will naturally interact with the potency for heat in the cold of the water elements. Insofar as the heating continues, the potency to be warmed is actualized, but once the change occurs new bodies result in mixtures and water. There is still a basic exchange of contraries in this interaction, but now we have a clearly identified agent and patient. This review reminds us that the agent/patient relationship is applicable to all levels of change. What we will see in the coming paragraphs, though, is that different kinds of change will correlate with differences in the agent/patient relationship.

Not all agent/patient interactions that lead to change are the same, and in order to see how the vegetative powers and the sensitive powers are distinct in kind, we will need to differentiate further the kinds of agent/patient interactions involved in each kind of change. In that regard, I want to draw our attention to two passages at the end of DA II.5. In the second half of the chapter Aristotle wants to distinguish multiple ways in which things are “affected” (\textit{paschein}), i.e. multiple ways in which a thing can be a patient. When Aristotle is discussing this notion of affectation in DA II.5, he compares it to the way we know. He writes

\begin{enumerate}
\item[(VI)] one who, from being in potentiality, learns and receives knowledge from one who is in actuality, and able to teach, either should not be said to be affected or there are two
types of alteration (alloiōsis), one a change towards conditions of privations (epi tas sterētikas), and the other towards positive states (epi tas hēxes) and a thing’s nature (tēn phusin).\textsuperscript{313}

Notice that, as we should expect by now, Aristotle distinguishes the directionality of change between change towards a privation and change towards a form. But also notice that here he gives two types of forms: (1) a change into nature or (2) a change into “positive states” (hēxes). This distinction is meant to track the difference between two kinds of affection that Aristotle mentions earlier in the passage, at DA II.5 417b2-5.\textsuperscript{314} There he indicates that there is one kind of affection that leads to the loss of a contrary and one that does not. Therefore, the distinction made in text (VI) indicates that there are two types of change, between a privation and nature and between a privation and a positive state. This also indicates that there are two alloiōseis that correspond with these axes. Why? Because in both kinds of affection there is a change in quality, but in one the change in quality destroys the underlying subject and in the other it does not. One might be tempted to think that the “two types” of alloiōsis are the change toward privation and

\textsuperscript{313} τὸ δ’ ἐκ δυνάμει ὅντος μανθάνον καὶ λαμβάνον ἐπιστήμην ὑπὸ τοῦ ἐντελεχεία ὅντος καὶ διδασκαλικοῦ ἢτοι οὐδὲ πάσχειν φατέν, ὥσπερ εἰρήτη, ἢ δύο τρόπους εἶναι ἄλλοισεως, τὴν τε ἐπὶ τὰς στερητικὰς διαθέσεις μεταβολὴν καὶ τὴν ἐπὶ τὰς ἔξεις καὶ τὴν φύσιν. (DA II.5 417b12-16) I have lightly modified Shields’s translation.

\textsuperscript{314} I admit that syntactically the intuitive way to read the explanation of the “δύο τρόπους εἶναι ἄλλοισεως,” is (1) an ἄλλοισεις towards a privation and (2) an ἄλλοισεις towards “positive states and a thing’s nature.” But considering the context of the passage it simply cannot be so. Consider that at DA II.5, Aristotle sets up the discussion as a consideration of the kind of change that constitutes “θεωροῦν.” He says, it is either (a) not an ἄλλοισεις or (b) a different kind of ἄλλοισεις. Then comes a remark comparing θεωροῦν with φρονοῦν, and that we do not say that φρονοῦν is an ἄλλοισεως. Then, adding another layer of explanation, Aristotle initiates a μὲν clause saying that the movement towards actuality from being in potential with regard to the intellectual activities of intellect is not a form of teaching, but must have some other name. Then comes a δὲ clause with a parallel construction indicating that the change to actuality from being in potency for one who is learning is either not an ἄλλοισεις or there are two kinds of ἄλλοισεως (“δύο τρόπους εἶναι ἄλλοισεως”). It would make no sense for the two kinds of ἄλλοισεως to be (1) a change towards a privation and (2) a change towards a state or a nature. Learning cannot be the former change, because clearly we gain something by learning. But neither can the standard type of alteration be the former kind of change, because clearly things do sometimes receive forms when they are altered. Therefore, I read the τὰς ἔξεις καὶ construction as defining an axis of ἄλλοισεως, which may come in two kinds, from privation towards τὰς ἔξεις and from privation towards τὴν φύσιν.

My reading of the two types of forms of ἄλλοισεως as two axes of ἄλλοισεως requires that the second “καὶ” be conjunctive rather than expegegetic. I have two reasons for not reading this “καὶ” expegegetically. The first is because the “τὰς ἔξεις” is plural and “τὴν φύσιν” is singular. While it is not inconceivable that a singular term can be equivalent to a plural term, it is nevertheless a red flag. The second, and more important, reason for not reading the “καὶ” expegegetically is that it would be strange for τὰς ἔξεις to be the same as τὴν φύσιν here. After all, the argument of this passage is trying to explain the difference between being affected (πάσχειν) in such a way that on the one hand there is the destruction of a contrary and on the other there is a “preservation of what is in potentiality by what is in actuality, and of what is like something in the way potentiality is in relation to actuality” (τὸ δὲ σωτηρία μᾶλλον ὑπὸ τοῦ ἐντελεχεία ὅντος τοῦ δυνάμει ὅντος καὶ ὁμοίου οὕτως ὡς δύναμις ἔχει πρὸς ἐντελέχειαν). (Cf. DA II.5 417b2-5) Certainly the difference between motion towards a privation and motion towards a nature/positive state does not explain those different types of affection, as I noted in the first paragraph of this lengthy footnote. But that is precisely what these different kinds of change would have to be if “nature” was equivalent to “positive states” in this quotation. But if change from privation towards a nature is different from change of a privation towards a positive state, then we could say that the destruction of a contrary occurs when there is a change in nature and the “preservation of what is in potentiality by what is in actuality” occurs when there is a change in a positive state. Therefore, in the larger context of the passage it makes more sense to read the “καὶ” conjunctively and not expegegetically.
the change toward a positive state, i.e. a thing’s nature. But if my argument in this dissertation is correct, those would not be different types of change, since change always happens along a contrariety axis. So, I read the two types of change here as two distinct axes of change. Aristotle confirms this distinction towards the end of the chapter. There he discusses two kinds of change in terms of two kinds of potentiality. He writes,

(VII) what is spoken of as being in potentiality is not without qualification, but rather in the first case as when we say that the child is potentially a general, and in the second, as when we say this of someone who is at the right age; and it is in this way that we speak of what is capable of perceiving.

In text (VII), we see two kinds of potentiality. Aristotle clearly intends to distinguish between two kinds of potency here, and both changes are a kind of alloiōsis since in both cases the object changes from not being some quality to being some quality. The potency to be a general for the child requires a change in age that is like a change in nature, because a child lacks certain abilities due to a lack of development, and thus has a sort of incompleteness in its being. But the change of an adult with respect to generalship is like a change in state, because in actualizing the potential for generalship one does not become complete after being incomplete, but develops a new skillset or a new disposition to act that is not necessary for the completion of one’s nature. We must also observe that the potency to become a general in both the child and the adult is not a 2nd potency, but a 1st potency. The reason is that “being a general” gives one the 2nd potency for constructing battle tactics and commanding military forces. This 2nd potency is rooted in the form of “being a general” just like any ability is rooted in a particular technē. Because “being a general” is not the reception of a new form or the perfection of a substantial form, it is not a typical alloiōsis, but a sort of “progression into the same state” (eis hauto gar hē epidosis), which Aristotle calls a new kind (genos) of alloiōsis. In my estimation, the “progression into the same state” appears to be the best explanation for what an alloiōsis tis is: it is a new kind of 1st actuality where the substance picks up a hexas rather than a new form. At the end of DA II.5 Aristotle says that these two kinds of 1st potencies do not have proper names, but that he will call the change into a form a “reception” (paschein) and the change into a state an “alteration” (alloiousthai). I will use the terms alloiōsis paschein and alloiōsis alloiousthai to distinguish between the two kinds of alloiōseis.

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315 Reading the καὶ in “τὰς ἔξεις καὶ τὴν φόσιν” as epexegetic. Cf. the previous footnote.
316 DA II.5 417b30-418a1.
317 In fact, at Phys. I.7 190b23-29, Aristotle lists the accidental property “musical” as being in the subject in the same way that “man” or “gold” is. So, these accidental properties are possessed as 1st actualities in which are rooted 2nd potencies.
318 DA II.5 417b6-7.
319 DA II.5 418a2-3. This distinction can be roughly mapped onto Code’s distinction between saying that a thing Is a particular form and saying that a thing Has a particular form, and my use of Is and Has in the schematic is inspired by his 1986 article. According to his logic, a thing receives (πάσχειν) a form, we can say the thing Is that form, but when we say it is “altered” (ἀλλοιοῦσθαι) it now Has a form. Cf. Code 1986. I say that this is only a “rough” application of Code’s distinction, because according to Code’s reading of Aristotle’s mature doctrine in Met. IX.6, a thing can only Be something in relation to its essence, and clearly a change in age is not an essential change (cf. Code 1986, 433-439). Yet it is close, because the change in age, say to adulthood, is indicated by the full(er) expression and use of powers that are natural to the substance as a result of its essence. As we will see in section 5.4.1 of the next chapter, the roughness of this application requires me to make changes to Code’s definitions of Is-ing and Having.
With this distinction in mind, we are now in a position to visualize how the various kinds of havingprivation relations cause change at the different levels of being. To help visualize this complex interaction, and to make it easier to discuss differences in the types of alloiōseis, I want to schematize the interaction. This schematic will show the contrariety between the agent and patient by identifying the form and privation contrariety that characterizes the 2nd potency’s actualization. It will also show the form and privation contrariety in the patient between the 1st actuality and 1st potency that act as extremes between which the motion can be an intermediate. The basic schematic is as follows:

In this schematic there are two form/privation relations, one between agent and patient as well as one within the patient. The variable represents the form that defines the contrariety. The agent/patient contrariety is the vertical axis, and this axis represents the 2nd potency/actuality relation. The axis of change within the patient is below the dividing line on a horizontal axis, and this represents change with respect to 1st potency and actuality. Notice that along the horizontal axis, the potency and act is defined either by not being and being the form x or not having and having the form. I intend “is not” and “is” to indicate a paschein alloiōsis and “has not” and “has” to indicate an alloioushai alloiōsis.

With that schematic established, let’s look at how the chemical change in (7) would be schematized:

What makes this change a typical alloiōsis is that the form in the agent is the same form that the patient will actually become as a first actuality. So, the fire has a privation of wet and cold qualities in virtue of its water elements, and it is this privation that makes the fire susceptible to action from the oil. When the oil interacts with the fire and both cools and moistens it, then the fire goes from not being cold and wet to being cold and wet. There is, of course, the contrary effect on the oil. This interaction should be intuitively obvious from our previous examination of basic change, and so the schematic is not doing a lot of work for us yet. That is because the schematic is structured so as to show a distinction between the vertical and horizontal changes that does not occur at this level. That being said, with this schematic established it will be easier to visualize the less intuitive changes where the patient changes from not-having to having.

When we turn to change within the vegetative powers, what we see is something similar. Despite the fact that the form being imparted is not a chemical form, the manner of form
reception is the same in vegetative changes as it is in chemical changes. This becomes obvious when we consider that in nutrition the agent is the soul whereas the patient is the undigested food. The undigested food, which is something else and therefore is not part of the living being, becomes part of the living being by receiving the form of the soul. I reconstruct the schematic for nutrition in the following way:

The agent in this activity is the living being because it has the soul that can unite diverse homogeneous bodies into the living body. The privation of soul is found in the undigested food, and so when undigested food is integrated into the body, it becomes ensouled by the power of nutrition so that it can become a part of the living body. So, the type of alloiōsis that happens in the food is a paschein alloiōsis.

We might wonder: should not the body also undergo a change in nutrition? The answer is that the body does undergo a change, not by the power of nutrition but by the power of growth. Once the food has been ensouled it becomes part of the body and causes growth within the body. In this case, there is still a paschein alloiōsis, since the body becomes a new size, just like the child becomes a new age. So, while the forms that are exchanged between bodies in chemical and vegetative interactions are different, nevertheless they both result in a becoming on the part of the patient that receives the new form. The fact that nutrition is a motion and a paschein alloiōsis shows another way in which it differs from chemical change. But this is not enough to show the difference between the change that occurs in sensation and the change that occurs in nutrition. For that, we need to identify another type of motion.

Let us turn to sensation. After text (VII), Aristotle finishes DA II.5 declaring that sensation is an alloiousthai alloiōsis rather than a paschein alloiōsis.320 So, in perception something like the following schematic has to be true:

The distinction in this schematic is clear. All agree that Aristotle is committed to the idea that in perception the sensitive creature does not become that which it perceives. And all agree that this lack of becoming the perceptible form is what Aristotle means by “receiving the form without matter.” So, my analysis in this section is not yet adding a new dimension to the discussion. But by illustrating these distinctions in schematic form, I am providing us with a visual way to distinguish the different changes. First, we see that in the agent/patient relation of the 2nd potency

\[320\text{ DA II.5 417b31-418a1.} \]
the interaction is made possible because of the formprivation contrariety between the two bodies and yet we also see that the agent does not undergo change. Second, we see that the change happening in the patient is a different kind of change from the interaction between the agent and patient. Being able to see these distinct changes and the differences in the contrarieties that constitute the change will be helpful for the new interpretation of sensation that I am offering below. So, this section has given us a tool that will be useful in analysis later on, because it will help us to identify when a paschein alloiōsis happens and when an alloiousthai alloiōsis happen. We will see that the alloiousthai alloiōsis is distinctive of the sensitive powers, and therefore shows that the motion of the senses is a distinct kind of motion.

Turning back to the distinction between the kinds of change, while the distinction is clear, what Aristotle means by it is not at all clear. That is evident when considering the voluminous literature about whether sensation is a “literal” or “spiritual” change. What is this state of “having” the form? Is there no becoming involved (i.e. is it a spiritual change) or is there some becoming involved (i.e. is there some kind of literal change)? And why is it that the organ, which is not the perceptible form, does not become that form, like in the other interactions? In other words, what prevents becoming and allows for having? DA II.5 does not answer those questions, but Aristotle does try to provide answers to those questions in the rest of DA II. That is the topic that we will turn to next, but I should warn the reader again that my reading of the text will necessarily touch upon topics central to the literalist vs. spiritualist debate. In the next section I will continue to prescind from the vicissitudes of that debate so that I can focus on parts of Aristotle’s theory of sensation that are not normally emphasized, principally the role of the medium in sensation. Once I have presented a complete reading of Aristotle’s theory of sensation, I will then enter the fray of the debate in section 4.4 and carve out a space for my reading within its bounds.

4.3: The difference of sensitive potency

To begin my reading, I first want to highlight that one reason why it is clear there is not a becoming on the part of the sense organ is precisely due to this fact that there is no direct contact between the organ and the sensible object. That is significant since all chemical changes are a result of direct contact. As we saw, it was the centrality of direct contact in change that led Aristotle to identify the tangible contraries as the basic contrarieties of change. What is more, Aristotle emphasizes that direct contact between the organ and the object of sense does not cause sensation. This is strange because the examinations of change in the previous chapters have all required direct contact between the interacting bodies in order to occur. But in sensation direct contact seems to hinder the change, rather than to cause it to happen. Aristotle notes this strange phenomenon at several points, saying that if we place the object of sight against the eye, we cannot see it, and if we place the object of smell in the nose, we cannot smell it. Touch, and to some degree taste, are hard cases, but Aristotle extends this reasoning to them as well. In the case of taste, although there must be direct contact with the tongue in order for us to taste the object, it

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\[\text{Cf. Chapter 2, section 2.2.1.}\]

\[322\]
\[\text{“Evidently an indication of this: if someone should place what has color upon the eye itself, it will not be seen.” (DA II.7 419a13-14) Also a little later: “Whenever one puts something sounding or something with an odor upon the sensory organ itself, it will not produce perception. Things are similar concerning touch and taste, though this does not appear to be so; the reason why will be clear later.” (DA II.7 419a28-31)}\]
is via moisture that we can actually taste the flavor.\(^ {323}\) And in touch, although the object of touch must be placed against the flesh, the flesh is not the organ of touch, but rather its medium. Why? Because, as we see in the case of gloves or a thin membrane placed over the hand, we can still feel things through these coverings. Flesh acts like a membrane, and so the flesh itself is the medium for the organ of the sense of touch.\(^ {324}\) So, a curious fact of all sensation is that sensation necessarily happens through some medium. Such a separation allows for a different type of interaction between agent and patient.

The difference in interaction is emphasized by Aristotle when he points out that the objects of the distal senses do not act (\textit{poiei}) on bodies in any way.\(^ {325}\) And while the objects of taste and touch do act on bodies, since they occur through contact by means of a primary quality (i.e. hot/cold, wet/dry), nevertheless there is a distinction between how the quality affects the body and how the sensible affects the sense. Aristotle explicitly makes this distinction by differentiating between the body of the organ that perceives and what is perceived: “The sense organ and this potentiality are, then, the same, though their being is different (to d’ \textit{eimai heteron}). For what does the perceiving is a certain magnitude; nevertheless being capable of perception is not.”\(^ {326}\) The emphasis that the capacity to perceive is not a potency in the genus of magnitude is significant. As we saw in chapter two, the four basic qualities were identified as tangible qualities precisely because they had to be qualities of bodies, which are necessarily magnitudes. Likewise, with the power of nutrition, Aristotle says that not just any contraries can count as food for the body, but only those that admit of growth: “Nutrition seems to be from a contrary to its contrary, though not from every contrary to every contrary, but only those contraries which have not only generation from one another but also growth (\textit{auxēsin}).”\(^ {327}\) These contraries are the contraries that properly belong to magnitudes, since magnitudes are properly said to grow. So, even in the case of the contact senses, the potency to sense is different than the potency to change according to the privations and forms of bodies. The fact that the potencies of sensation are not potencies of magnitude and the fact that sensation happens by indirect contact through a medium tells us that for Aristotle there must be a new set of contraries that operate in sensation that are distinct from those in bodily change.

Let us turn back to a consideration of the medium. The medium is what allows for the sense organ to interact with the object of sensation without undergoing a change in the qualities of bodily magnitude. The role of the medium clearly is central to sensation, for the majority of Aristotle’s discussion of the particular senses concerns how the medium facilitates sensation. But how does the medium enable perceptual interaction? I think that answering this question is the key for understanding how the senses can \textit{have} a form without \textit{becoming} that form, and therefore is key

\(^ {323}\) “Nothing produces the perception of flavor without moisture; rather, it is what has moisture in actuality or in potentiality, as something salty, for example, does. For it is both itself easily dissolved and also melds with the tongue.” (DA II.10 422a17-19) I will go into this in greater detail below.

\(^ {324}\) “[S]ince we do perceive all things through some intermediary, though in some cases this escapes our notice. Even so, just as we also said earlier, even if we were to perceive all tangible things through a membrane without noticing that it lay between us and them, we would be in much the same condition as we are now, in fact, in water and air. For we now suppose ourselves to touch the objects themselves, with nothing happening through an intermediary. . . . In this way too it is clear that the capacity to perceive an object of touch is internal. It would turn out here just as it has in the other cases: one does not perceive things placed upon the sensory organ, but one does perceive what is placed upon the flesh. Consequently, flesh is the medium pertaining to the faculty of touch.” (DA II.11 423b7-27)

\(^ {325}\) Cf. DA II.12 424b10-12.

\(^ {326}\) DA II.12 424a24-27.

\(^ {327}\) DA II.4 416a22-24.
for understanding Aristotle’s theory of sensation. The way to understand how the medium facilitates sense perception is to look carefully at how Aristotle describes its role in particular acts of sensation. What I will do next is to examine the role of the medium in two senses in detail, hearing and taste, and see what we can learn from that examination. I chose these two senses because they are representative of a distal and contact sense. I have also chosen them because the most common exemplar is the sense of sight. While there is good reason to start by examining sight (after all, Aristotle himself does the same) nevertheless much of the literature on the matter never really gets beyond a careful examination of the sense of sight. So, it will be beneficial to use two different exemplars in order to bypass a sort of “visual capture.” I will then extrapolate from that examination of hearing and taste in order to understand change in the other senses.

In the case of hearing, the object of sensation is, of course, sound. But sound is a unique object of sensation. Unlike other objects of sensation it does not exist in the agent of sound. As Aristotle says, “Actual sound always occurs as the sound of (1) something, (2) in relation to something, and (3) in something.” This is a clear example of an agent/patient relationship, in that there is a striking object and a struck object in the creation of sound, and the struck object must be of a certain type of material and shape that has the ability to vibrate.

What makes sound unusual, then, is that it properly exists in the medium, but only as the medium is being impacted by a vibrating object. This unique feature of sound, that it does not exist in the agent making the sound but in the medium that transmits the sound, helps to shine a spotlight on the role of the medium in sensation. Because I want to place special emphasis on the medium, examining this object of sensation in particular will help in understanding the importance of the medium in sensation.

Let us schematize the relationship between the struck object and the air in the following way:

![Diagram]

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328 DA II.8 419b9-10.
329 “it is bronze and whatever is smooth (λεῖδα) and hollow (κοιλὸν); bronze because it is smooth, while hollow things produce many impacts after the first by reverberating (τῇ ἀνακλάσει), since what has been set in motion is unable to escape (ἀδύνατοντος ἑξελθεῖν).” (DA II.8 419b15-18)
330 “This occurs when impacted air remains and is not dispersed. Accordingly, whenever air is impacted swiftly and violently, it makes a sound.” (DA II.8 419b21-22) An example of unstable air might be a windstorm, where the lack of stability prevents sound from traveling through it, at least in Aristotle’s theory.
331 One may wonder: if the sense of hearing is so different, why choose it as representative of the distal senses? While hearing is different in that the property sensed is in the medium rather than in the object causing the sensation, it is not actually different in the basic features of its function. Whether the sense object is in the substance that causes it to exist or in some other substance is not so important as the relation between the sense object, sense medium, and sense organ. That becomes apparent when my discussion turns to an examination of sight and color. Again, the reason I want to start with it rather than another sense is that it our attention is immediately turned towards the medium and how it is necessary for the function of the sense.
What this schematic shows us is that in the air something new comes to be, namely a sound. This is because air vibrates only under certain conditions, namely when the sound producing object vibrates at a speed fast enough to outpace the natural dispersal of air. This unique outpacing of air’s natural tendency to disperse creates the vibration in the air that Aristotle identifies as sound. Notice, too, that in the schematic I have labeled the actualization of sound within the medium as a kind of becoming, or a *paschein* alloiōsis. It must be this kind of alloiōsis since a new object comes to be within the air as a patient.

While sound is unique, it becomes apparent that the same kind of alloiōsis occurs in the media of sight and smell as well. In the case of the medium of sight, the medium becomes illuminated, and this illumination allows the form of the color to be transferred. Aristotle writes, “Every color is capable of setting in motion (*pan de chrōma kinētikon esti*) that which is actually transparent; and this is its nature (*phusis*).” Again, “color moves the transparent, e.g. air, and the sensory organ is moved by this, which is continuous.” That this is the same kind of motion as sound Aristotle makes explicit, saying “It is also the case that the colorless is capable of receiving color, and the soundless sound.” While color does actually exist in the colored object, it causes color to exist in the transparent medium by means of causing a motion in the transparent medium. So, color causes motion to come to be in the transparent medium. It turns out that it does not matter whether the object of sense exists in the medium, as it does with sound, or in a separate substance, as it does with color. The point is that the object of sense causes a change in the medium by causing a motion.

Although it is a little more complicated, something similar happens with smell. Air and water are mediums for smell, and Aristotle writes in the *De sensu*, “We customarily predicate transparency of both air and water in common; but it is not *qua* that either is a vehicle of odor, but *qua* possessed of a power of washing (*plutikon*) or rinsing (*rhuptikon*) the [flavored] dry.” The words for washing and rinsing are unusual in this context, because they are normally used in describing how clothes are cleansed of dirt and stains. But here the analogy seems clear. The moist body (air or water) is capable of “lifting away” the flavor from the flavored dry, which is the cause of the object of smell in the odorous body. This is particularly interesting, because of what Aristotle points out later in this chapter of the *DS*, “The elements, viz. fire, air, earth, and water, are without odor, because both the dry and the wet among them are without flavor, unless they are made into a certain mixture.” Remember that in discussing mixtures and intermediates, I noted that these are specified by a new property, and so it is unsurprising that here Aristotle identifies one of the intermediate properties that specifies an intermediate between wet and dry as flavor. Flavor is more dry, but by some unnamed ability associated with moisture, the medium of smell “washes” and “rinses” the flavor from the dry and becomes odorous. The odor exists properly in the medium, since the object causing the odor is more properly said to be flavored. But in this case, too, we see that the medium becomes something by means of the motion of the object being sensed.

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332 DA II.7 418a31-b2.
333 DA II.7 41913-15.
334 DA II.7 418b26-27.
335 DS 5.442b30-443a1. Oxford translation. Johnstone points out the significance of the terms here, even if he does not take the same line of interpretation that I do. Cf. Johnstone 2012, 155-156.
336 DS 5.443a10-12. The translation is mine.
The similarities in the interaction between the object causing the sensation and the medium in the distal senses is striking. But more importantly, the interaction brings about something new in the medium by causing the medium to become (paschein alloiōsis) in a particular way. This novel way in which the medium becomes the object of sense is an essential first step to understanding the role of the medium in sensation and how the sense organ can have (alloioustitai alloiōsis) the form of the sensible rather than become it. The second step requires that we see how the causal relationship between the medium and the sense organ is different.

Why does the medium not cause a similar change of becoming in the sense organ? To answer that question, let us turn back to the sense of hearing. What Aristotle says next tells us something important about the relationship between the medium and organ of sense. He writes: “Air is congenital (sumphuēs) to the organ of hearing; because the air is unified, when the outside air is in motion, the inside air is moved.” What this means is controversial. As Polansky remarks, “Commentators have been disturbed that Aristotle suggests that the ear naturally attaches to the external air since elsewhere he uses sumphuēs for cases in which things are naturally grown together rather than merely in contact (see even a12 and 423a5).” However, what others see as disturbing, I see as congenial. What Aristotle seems to be saying is that there is a natural continuity between the medium and the organ of hearing as a result of the presence of the element of air in both. The continuity between the air inside and outside the ear means that there is a way in which both bodies of air are one. As Aristotle says about continuity in the Phys. V.3: “things are called continuous when the touching limits of each become one and the same and are, as the word implies, contained in each other: continuity is impossible if these extremities are two... and in whatever way that which holds them together is one, so too will the whole be one.” The air inside and outside become one, however, only when the air outside is made continuous by the sound. So, the making of the air to be continuous by the rapid vibrations of the sounding object also creates the continuity with the air in the ear. What this means is that the becoming of the air that creates sound within it is also the same activity that unites it to the air inside the ear.

The conclusion that I draw from this is that when there is continuity between the external air and the air of the ear, the motion outside of the ear is shared with the air inside the ear by virtue of the union due to continuity. But notice: Aristotle indicates that the air inside does not undergo bodily change. After all, it “has been encased, in order to be unmoving.” All that changes is its contact with the external air, and it is by virtue of this contact that the air inside the ear has what is in the air outside the ear. Thus we get the following schematic:

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337 áκοη δὲ συμφυής ἀέρι· διὰ δὲ τὸ ἐν ἀέρι εἶναι, κινουμένου τοῦ ἔξω ὁ ἐίσω κινεῖται. (DA II.8 420a4-5)
338 In particular there are textual issues with the phrase that Shields translates as “the air is unified” (τὸ ἐν ἀέρα). This phrase is only attested in the commentaries of Simplicius and Philoponus and is not found in any of the manuscripts. Instead, the manuscripts have “in air” (ἐν αἰεί). While there is a substantive difference here, that difference does not change my reading of what the text says about the relationship between the medium and the sense organ. What is important for what I am saying is that there is a continuity with the air, whether that be because the organ is in air or because the air in the ear is one, matters little for my view. I will deal only with the controversy regarding the phrase áκοη δὲ συμφυής ἀέρι that comes before.
340 Phys. V.3 227a10-16.
341 DA II.8 420a9-10.
The air inside the ear really does share in the sound of the external air, but it receives the air in a manner like how a bronze sphere receives sound from a tuning fork that touches it. The bronze sphere vibrates to the note of the tuning fork as long as the fork is in contact with it, and stops once the fork is removed. The fork is the object that properly has the vibration, since it continues to vibrate whether or not it touches the sphere and determines the frequency at which the vibration occurs. It shares that vibration with the bronze sphere as long as the two objects are in contact, and when they are in contact the two share one vibration. This analogy breaks down because this is a bodily interaction, and the sphere does become the same vibration as the fork. But it is apt because the vibration of the sphere, both the fact of vibration and its frequency, is determined and dependent upon contact with the fork and cannot maintain the vibration at the same frequency without that contact. Also, the sphere can receive the vibration frequency of any tuning fork or reverberating object with which it comes in contact. But the fork can only vibrate according to the same frequency every time. So, the vibration is in the fork in a way it is not in the bronze sphere. So, in an analogous way, the fork is the frequency whereas the bronze only has the frequency through contact.

But there is more to add. After all, sound at this stage of the discussion looks like a subclass of vibrations, which is a type of locomotion, not a quality. But Aristotle adds that the presence of the sound in the ear allows the ear to receive the qualities of sharp and flat notes. He writes, “For just as colors are not seen without light, so sharp and flat are not heard without sound.” In this way, then, the medium is able to convey the perceptible quality to the organ, but without the organ becoming what is conveyed. Rather it has it by virtue of contact and as a result of similarity between the organ and the medium. The general structure here is that it is the medium’s interaction with the object of sensation that causes a change in the medium, and this change produces the sensible in actuality in the medium. However, because of the likeness of the medium with the organ of sense, the continuity between the two enables the sensible form to pass along to the organ of sense the form of the sensible without changing the organ of sense. This holds true for all the senses, not just the distal senses which have been our focus so far.

We have looked at how the distal senses are able to have a perceptible form without becoming that form. But now we need to look at the contact senses, since the medium is different with respect to these senses. Aristotle identifies the peculiarity of these last two senses when he begins to talk about taste. He writes, “An object of taste is something tangible; and it is for this reason not perceptible through the medium of a foreign body, since touch does not come about this way.” So, unlike in the distal senses there is direct contact of the perceptible object with the body. Yet, there is still a medium of sorts that intervenes between the sensible object and the sense

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342 DA II.8 420a27-29.
343 Polansky comments, “[Aristotle’s] claim about the ear is the first time Aristotle makes explicit that the sense organ and medium are materially the same or quite akin.” (Polansky 2007, 291)
344 DA II.10 422a8-10.
organ that allows sensation to occur rather than a basic change. The medium in this case is not a foreign body, but instead a part of the same living body, and in the case of taste it is the bodily quality of moisture. As Aristotle says concerning the contact sense, “the object of touch differs from the objects of sight and hearing, since we perceive these latter because the medium affects us in some way, whereas we perceive the objects of touch not in virtue of having been affected by the medium but simultaneously with the medium.”

How does this work?

Look at what Aristotle says about the object of taste: “the body in which the flavor is, the object of taste, is in moisture, which is its matter (en hugroi ὡς hulē).” As we noted before, the objects we taste have flavor as a property, and the moist body “washes” or “rinses” the flavored dry from the tastable object. In the case of taste, the rinsing ends in a liquid mixture that is also flavored. Now Aristotle explicitly calls the moisture the “matter” of the flavor. This indicates that the flavor is not an intermediate between moist and dry, because then the moisture would be a form (albeit a potential form) not the matter. Instead, the flavor is something that supervenes on the quality of moisture in the liquid body, which we would expect. But the way the flavor is passed on to the tongue is not what we would expect, at least not if we were expecting a usual chemical change. After all, in normal chemical changes the qualities of one body interact with another body that is deprived of that quality. So, moist bodies interact with dry bodies and give the dry bodies their moisture. But just the opposite seems to be happening here. In order to taste, a dry body must become wet. Aristotle says:

(VIII) Since the tastable is something moist, its sensory organ must be neither moist (hugron) in actuality nor incapable of being moistened (hugrainesthai). For taste is something affected by the object of taste insofar as it is an object of taste. It is necessary, then, that the sensory faculty of taste, though it is not itself something moist (hugron), be capable of being moistened (hugranthēnai) and of being preserved when moistened (hugrainesthai).

Any translator of this passage ought to be pitied, because Aristotle’s attempt to be precise in articulating the relationship between the organ of taste and wetness turns out to be very confusing. The principal takeaway point for our purposes is that the tongue must be wet in order to receive flavor from a wet body. So, it is not by virtue of the contrariety of the bodily qualities that the flavored object is tasted. Rather, like with the distal senses, it is the likeness between the two bodies that allows the medium to share its perceptible quality with the organ. Flavor is able to be received by the tongue precisely because the tongue is of the same matter, i.e. wet, as the body that contains the flavor. So, the conveyance of the flavor from the food to the tongue is via the continuity of the quality of wetness between the organ of taste and the tastable object. So, the quality of wetness is the medium by which the quality of sense is passed on.

Why does this interaction cause the tongue to have flavor rather than become flavored? To become flavored, the tongue would have to be contrary to the object of taste in its elemental profile. After all, to become flavored by an object of taste requires there to be a way that the

345 DA II.11 423b12-15.
346 DA II.10 422a10-11.
347 ἐπεὶ δ' ὑγρὸν τὸ γευστόν, ἀνάγκη καὶ τὸ αἰσθητήριον αὐτοῦ μήτε ὑγρὸν εἶναι ἐνετέλεσθαι μήτε ἀδύνατον ὑγραίνεσθαι· πάσχει γὰρ τι ἢ γεύσεις ὑπὸ τοῦ γευστοῦ, ἢ γευστόν. ἀναγκαῖον άρα ὑγραίνεσθαι τὸ δυνάμενον μὲν ὑγραίνεσθαι σοζόμενον, μὴ ὑγρὸν δὲ, τὸ γευστικὸν αἰσθητήριον. (DA II.10 422a34-422b5) I have altered Shields’s translation slightly.
flavored object changes the unflavored body so that it becomes the flavored. Now, according to
text (VIII), to receive the flavor, the flavored object is something wet. So if the flavored object
were causing the sensing body to becoming flavored, the sensing body would need to be dry to
interact with the wetness of the flavored object and be made wet in the process. But Aristotle says
that the tongue is not made wet by a foreign body. Instead, the living body makes the sense organ
wet so that the sense organ becomes like the object of taste in terms of the quality of wetness. If the
tongue were becoming flavored, rather than having flavor, it would have to be made wet by the
object of taste, not by itself. The flavored object, then, cannot make the body become flavored
when the body tastes the flavor, for that would require that the tastable object be wet and the
tongue dry, thus having a chemical contrariety between sense object and sensing organ. Instead,
something else happens. It is only when the tongue and the tastable object are like one another in
elemental profile that the tongue is able to taste the flavor. This fact of the interaction means that it
is the likeness between the now wet tongue and the wet flavored object that permits the passing of
the flavored quality to the tongue. Therefore, the tongue has the flavor it does not become it.

Touch is a more difficult sense to understand, and even Aristotle himself finds it a hard
case for his theory. This is partially because, unlike with the other senses, the sense of touch is
sensing the qualities of body, hot/cold, wet/dry by means of contact, and in normal circumstances
this should bring about a chemical or vegetative change. There is the added difficulty that there
does not appear to be a separate medium through which touch senses these objects. So, we have to
discern how it is that the sense only has the form of the elements and their mixtures, rather than
become them.

In solving this puzzle, first note that in DA II.11, where Aristotle discusses the sense of
touch, he begins with an extended discussion of whether or not the sense organ is internal or
external, i.e. whether the flesh is the sense organ. He concludes this section with the affirmation
that “flesh is the medium pertaining to the faculty of touch.” Aristotle’s statement here is clear
that the flesh is the medium. As a result, we can distinguish the faculty of sensation from the
medium, which is the flesh. This is important because, as we have seen, the medium provides the
necessary separation between object and sense faculty that allows the faculty to have a sense
property rather than become it.

Of course, as a contact sense the medium operates differently. Instead of receiving the
sensible object through the medium, Aristotle says that we receive the sensible object with the
medium. This odd fact is partially a result of the medium being a part of the living body.
Aristotle says that, “it is necessary that the body be a naturally attached (prospephukos) medium
belonging to the faculty of touch (tou haptikou).” The sameness of nature is not just the fact that
the flesh is a part of the living body, but because the flesh and the internal sense organ are the same
elemental profile, i.e. they have the same mixture of the four primary elements. This natural
attachment is the curious part. Unlike with the other senses, the body does become the form of
touch it receives, but it does so by receiving that form in the medium of the flesh. The flesh is like
other media in that it does become the form it receives, but it is different from other media because

348 “The objects of touch are then the distinguishing features of a body insofar as it is a body. By
distinguishing features I mean those which characterize the element which we spoke about earlier in our writings on the
elements: hot and cold, dry and wet.” (DA II.11 423b27-29)
349 Cf. DA II.11 422b34-423b26.
351 ἀλλὰ διαφέρει τὸ ἄπτον τῶν ὁρατῶν καὶ τῶν ψοφητικῶν, ὅτι ἐκείνον μὲν αἰσθανόμεθα τῷ μεταξὺ ποιεῖν
tι ἡμᾶς, τῶν δὲ ἄπτον οὐχ ὑπὸ τοῦ μεταξὺ ἄλλο ἀμα τῷ μεταξὺ, ὡσπερ ὁ δὲ ἄσπιδος πληγεῖς: (DA II.11 423b12-15)
352 DA II.11 423a15-16.
it is a part of the sensing body. But the flesh is not the organ of sense, but joined to the organ of sense by nature and by similarity in elemental profile. So, the flesh shares with the organ of sense the form it receives so that the organ has the tangible form without becoming the tangible form, as the flesh does.

This fact is admittedly difficult to tease out in the general flow of what Aristotle says, but he does indicate that the organ is an intermediate just like the fleshly medium. As his conclusion to the question about whether the flesh or the sense faculty itself is a medium indicates, Aristotle considers the flesh an intermediate of the qualities of touch (the English words “medium” and “intermediate” are translating the same Greek word). Then immediately after this conclusion, he turns to the consideration of the faculty of touch properly so called. And there he says that the “sense is a kind of intermediate of the contraries in the sensible objects.” By “sense” (aisthēseōs) Aristotle must, in part, be referring to the sense organ, for he says a few lines earlier (at 423b30-31) that the organ is “that in which these sense called touch primarily belongs” and the sense can only be an intermediate by virtue of the elemental profile of the organ. So, the sense organ and the medium of the flesh are the same intermediate property, and this similarity allows a continuity between them. This point matters because while the flesh becomes something during sensation, the sense organ does not. It is the likeness between the sense organ and the flesh that allows the flesh to share the sense property it receives with the organ of touch without the organ of touch becoming anything. Therefore, the organ of touch has the form of the sensible, it does not become it.

Aristotle says that it is because of the intermediate that the sense organ is able to perceive the tangible sense object. The reason is, as in the case of the other senses, this intermediate state allows the organ of touch to receive what the medium of flesh has partially become without actually becoming that difference. But note that the sense faculty distinguishes (kritei) when the object touched differs from the intermediate state of the sense organ in any contrary direction. So, what the sense organ receives is a sense of the relative difference in the form that the organ has from the fleshly medium. So, it cannot sense objects that have the same, or very similar, intermediate properties because there will not be a change in the fleshly medium. While the sense of touch is complicated, we can see that it operates in a way like the other senses: the medium undergoes a change in being, and the similarity between the organ and the medium allows for the medium to share its new property with the organ without the organ becoming that property.

We now have enough information to see how the changes that occur in sensation differ in kind from those that happen in chemical and vegetative changes. What we have seen in this section is that the medium plays an essential role in sensation. The medium allows for the separation of the sensible quality because it acts both as a buffer between the organ of sense and the sensible object,

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353 I should also note that flesh does not become all the tangible properties. As Freeland points out, the flesh of our fingers do not become brittle when we touch something brittle (Cf. Freeland 1992, 232). But since all the tangible contraries are intermediates of the hot/cold, wet/dry contrarieties, the fact that the flesh changes with respect to these extreme qualities is sufficient for the flesh to act as a medium for all the sensible object of touch. After all, none of the other media become the quality in exactly the same way at that quality exists in the object sensed. Rather, a medium undergoes a modified change that enables the form to be transmitted through it. So, air does not become colored when we see color through it, although it does become illuminated. Likewise, the liquid saliva does not become dry even though it rinses off the flavored dry from the object of taste in order to be flavored. In each of these instances, there is a change in the medium but not such that the medium becomes the sensible in the way that the sensible exists in the object sensed. Likewise with flesh. It is sufficient for flesh to take on the extreme contraries in order to transmit to the organ the sensible form.

354 Cf. DA II.11 423b27-424a16.

355 ὡς τῆς αἰσθήσεως οὖν μεσοτήτος τινος ούσης τῆς ἐν τοῖς αἰσθητοῖς ἐναντιώσεως. (DA II.11 424a4-5)
The translation is mine.
preventing the organ from being corrupted, and as a vehicle for the quality. Because the medium is unlike the sensible object, it undergoes a material change that allows it to take on the sensible quality. But, being like the sensible organ and being in continuity with that organ, the organ is able to share in the actualization of the medium brought about by the change in the medium without becoming that form. All of this allows us to make sense of Aristotle’s remark in DA II.12 that sensation receives the form of the perceptible without receiving the matter.\textsuperscript{356} Because of the sense medium, the organ is able to receive the sensible form without undergoing a change with respect to the elemental profile of the organ’s body. It really does receive the form, but it does not receive the matter precisely because its elemental profile stays the same. Since the sense organ does not undergo a chemical change in sensation, and because it receives the form without the matter, rather than receiving the matter without the form as the nutritive powers do, therefore the sense organ undergoes a change that is different in kind from that of chemical changes as well as the vegetative powers.

As promised, my conclusion has us knocking on the door of that fraught debate between literalists and spiritualists with respect to change in the organ. Does my investigation commit me to either literalism or to spiritualism? I think it commits me to reading Aristotle in spiritualist terms, although I will be departing from strict spiritualism to a significant degree. Why I am committed to this will become apparent if we briefly review the vast literature on the topic.

4.4: Perception: a literal or spiritual alteration?

Having examined the relationship between the medium of sensation and the organ of sensation, I now must turn my attention to the controversy over perception as an alloiōsis tis. The controversy here is whether or not the alloiousthai alloiōsis of perception is a “literal” change or a “spiritual” change. At this point the controversy is so entrenched that there is even some debate over the meaning of the terms “literal” and “spiritual” change.\textsuperscript{357} While the stakeholders in this debate are Legion, the famous progenitors of it were Richard Sorabji and Myles Burnyeat. Sorabji’s position is that the sense organ, in receiving the sensible form, undergoes some sort of physiological change (or a paschein alloiōsis in the terms I have been using in this chapter) as a result of receiving that form. Burnyeat opposed this view, saying that the sense organ does not undergo a physiological change as a result of receiving the perceptible form. With a nod to Thomas Aquinas, Burnyeat called this type of change a “spiritual change” to differentiate it from the more literal kind of change found in Sorabji’s position. The various papers that these two marshalled against one another are touchstones for all other interpretations in the debate, even those that differ significantly from both of the initial views. If one’s interpretation is like unto Sorabji’s and claims that some sort of physiological change is part of sensation, then one is considered a “literalist.” If one’s interpretation is like unto Burnyeat’s and claims that physiological change is not part of sensation, then one is in the “spiritualist” camp.

Readers familiar with the debate may have noticed that the interpretation of the act of sensation that I have presented above is broadly a “spiritualist” one. I say “broadly” because there is much of my interpretation that is indebted to Sorabji’s insights and text selections and, in

\textsuperscript{356} DA II.12 424a17-19.

\textsuperscript{357} Caston 2004 is the most comprehensive survey of the various positions and, in a way, has set the parameters of the discussion ever since. Johnstone 2012, 144, fn.4 makes much the same remark about Caston’s work in summarizing the debate up to the time of his article.
addition, I have learned much from those who claim to be taking a middle road in the debate.\textsuperscript{358} Despite the differences, I am arguing that my view is well within the spiritualist camp. This fact may be perceived as a cost for my account, since the spiritualist position is not the consensus view. I am entering into the debate here not only to defend the cost of such a position, but to show that my view makes spiritualism the correct reading of Aristotle’s theory of change in sensation. Therefore, having presented my reading of the text above, I will now clarify it and defend it within the context of the debate over literalism and spiritualism. What I will do is to review some of the details of the debate and show why the spiritualist interpretation is fundamentally the correct one, while at the same time recognizing why Sorabji’s argument is so convincing.

4.4.1: The likeness and unlikeness of change in the medium of sensation

In all four middle views that I presented, we see the various scholars trying to reconcile the necessity of a physiological change in organ with the Aristotelian notion that we receive the form without matter. In all four cases, the physiological change is somehow necessary for the sense organ to receive the perceptible form. In this way, all of these views show a sympathy for Sorabji’s literalism, and, as a result, while they try to be middle views they end up closer to the literalist position since they highlight the physiological change that is happening in the sense organ. My view, presented in the first part of this chapter, emphasizes the physiological change in the medium, but minimizes the importance of a physiological change in the sense organ itself. That is why I am presenting my view as a spiritualist view, even though I do accept some criticisms against Burnyeat’s mature position.

The criticisms I accept are with respect to the medium. As I said earlier, it is notable that the vast majority of \textit{DA} II.6-11 concerns the role of the medium in perception, and I think this fact is significant. The medium is meant to provide a buffer between the sense object and the sense organ that permits sensation. What I think happens in the course of sensation is that Sorabji’s modified version of a literal \textit{alloiōsis} occurs, but it occurs with respect to the medium. That is, the medium of sensation, while not permanently taking on the qualities of the sensible object, does receive the sensible quality in a borrowed sense, and so it undergoes a literal alteration, where there is a physiological process that makes the medium like unto the object of sensation. Sorabji accepts this in 4 out of the 5 senses, saying that the air becomes smelly, and water becomes tasty. Yet, if the object we smell and taste is cheese, neither medium becomes cheese, it just takes on the cheesy smells and flavors.\textsuperscript{359} The one case where Sorabji denies that this happens is in vision, which is his touchstone example for discussing sensation. But, I think that even in the case of vision the medium undergoes a literal \textit{alloiōsis}. It is just that in the case of vision the alteration is not caused by the object of sensation, but by the light source which illuminates the medium. So, I agree with Sorabji that there is a way in which the medium is affected by the object of sensation differently from the sense organ. I also agree with him that there is a literal \textit{alloiōsis} in the process of sensation. However, I think that the textual evidence only points to this change happening \textit{in the medium itself}.

If we look closely at Sorabji’s arguments and examine the texts he marshals in support of his thesis, we see that he is emphasizing the way in which the organ of sense is potentially what

\textsuperscript{358} For example, Caston 2004; Shields 2007; Polansky 2007; Johnstone 2012; Johnstone 2013; Marmodoro 2014.

the sensible object is actually. He then shows that based on Aristotle’s theory of change, to operate the sense must be actualized. Aristotle also carefully notes that part of this potency in relation to the sensible object is an *elemental* one. Sorabji uses this fact to drive his point home:

(IX) For when he says at 423b30-1 that the sense organ is potentially such, the ‘such’ refers to the ‘hot, cold, dry, and fluid’ at 423b28-9. A little lower at 424a7-10, he says that the organ is potentially, but not actually, white, black, hot, or cold. And this informative description is intertwined with some of the others, because it immediately follows the explanation that the organ is potentially such (i.e. hot, cold, dry, or fluid, 423b31, and that being potentially such, it is then made such as the object is in actuality (424a1-2).360

This is a very good point, and one that enables him to dismiss Burnyeat’s interpretation of *DA* II.5 as irrelevant because it says nothing about the material process, but has only stopped considering it *pro tempore*. However, the one thing Sorabji fails to note is that this same set of material potencies is found in the medium. Again, when Aristotle discusses the appropriateness of the medium, he explicitly mentions the medium’s material composition and how it is relevantly similar to the organ. We must consider: if the material potencies of the *organ* are what is relevant to sensation, why is a medium important at all? Why not just have the object of sense actualize the organ directly? After all, if the medium and the organ change in the same respect, there is no meaningful role for the medium to play.

The answer is that there needs to be some way of separating off the sensible quality, and all agree that the medium’s job is to provide a delivery system to the organ so that it can receive the “form without the matter.” But if so, the medium must be providing some sort of buffer zone between the object of sense and the sense organ. Since the medium and the organ of sensation are fittingly associated because of their relevant similarities in their elemental profiles, then what the medium is buffering the organ from must be a change in the elemental profile, i.e. in the material makeup of the organ. So, I do think that Sorabji’s arguments are on target, but by missing the key reason why Aristotle thinks we need a medium, Sorabji ends up not seeing that his arguments about a literal change are appropriate for the medium, not the organ of sensation.

Where he is wrong is that sensation brings about a literal *alloiōsis* in the organ. I think that it is precisely the similarity between the elemental profiles of the organ and the medium that permits sensation to occur. The similarity allows for continuity between the organ and the medium, such that a change in the medium, where the medium receives a new form, can be shared with the organ without the organ undergoing a change itself.

However, that does not mean I completely deny that there is any meaningful physiological change in the organ. As I noted above, Aristotle does seem to insist that the ear vibrates when it receives sound. I also discussed how the tongue becomes wet when it tastes flavor. On this account, my view is, in many respects, similar to that of T. K. Johansen. He concedes that the idea that there is no physiological change in the process of sensation is wrong. He considers sensation to be more like a 2nd potency, what he calls an “f-change,” and admits that such changes are “fully compatible with there being necessary material [ordinary changes] involved.”361 But these physiological changes are not what is essential to the process. Instead, on

360 Sorabji 1992, 212.
361 Johansen 2013, 165.
my view, it is the similarity of the organ with the medium that allows the medium to share the property it has received in a physiological way with the organ.

Johansen points out that it is important to separate what is perceived from what happens to the organ physiologically. For one, it is clear that the sense organs, in their normal operations, never lose their potencies for sensation even when they receive the sensible forms. Johansen writes, “it is hard to see how a literally colored organ would retain its transparency and so be able to immediately perceive other colors without distortion. On the interpretation proposed, in contrast, vision may involve material change which while communicating color in some way does not do so by literally coloring the eye.”

The point here is that if, indeed, there is a change in the matter of the organ, one would presume that it would lose its potency. But it does not. Rather, the matter stays in potency to the object of perception because it does not undergo a material change with respect to that object, but receives the form nonetheless because the medium has received the form through a more normal kind of physiological change. Johansen further remarks that the separation between what is physically happening in the organ, and what is happening in sensation, is clear in the case of hearing. He writes, “when I hear you speak I hear your voice not the sound vibrating in my ear (that would be rather distracting). So, while it is the perception of sound that constitutes hearing as such, since sound as such is the proper object of hearing, the process of hearing is one that is realized by a spatial motion in the medium and the inner ear.”

Sound, as an object, really is different from vibration, and interacts with the sense properly so-called rather than the material of the ear. This is not unlike Johnstone’s view, except that Johnstone requires that the organ undergo the kind of chemical changes that the medium undergoes as well.

What makes my view a spiritualist view is that it makes the sense faculties and objects more explanatorily basic than either Sorabji’s literalist view or the middle views. This is why we can consider perception a different kind of change, a more “spiritual” change, than chemical changes and the changes proper to the vegetative powers. For in the case of the senses, they receive the form of the sensible objects without becoming like the matter of those objects, and in this way the senses are said to “receive the form without the matter.”

4.5: Conclusion

As we have seen, sensation is a different kind of change than that found in non-living beings and among plants. We have seen that it is a change where the form is of the sensible object is passed along but not the matter, whereas non-living change exchanges both form and matter while vegetative change exchanges the matter without the form. We are now ready to examine the kinds of change appropriate to what is often categorized today as mental activity. There is some confusion over the next interior operations, however, in that some of them, like memory and imagination, are much closer to what we think of as mental activity today. Yet, in much of the tradition of commentary, these activities are more associated with sensation than with intellection. So, how do the activities of the intellect proper differ from that of sensation, memory, and imagination in Aristotle’s thought? That will be the task of the next, and final, chapter.

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362 Johansen 2013, 166.
363 Johansen 2013, 167.
Chapter 5: Distinguishing the Sensible and Intelligible Contrarieties

“Now there have been philosophers who denied all difference between intellect and senses. But clearly the intellect cannot be any one of the exterior senses already considered; for its apprehension is not restricted to any one particular class of sense objects.” (Thomas Aquinas In De anima III lect. 1, n.564)
5.1: Introduction

We have now arrived at the most difficult part of our investigation. In our final inquiry we must wade into the waters of some of the most obscure texts in all the Aristotelian corpus: DA III. To make our investigation manageable in one chapter, I am going to limit the scope our inquiry. The way I am going to restrict our inquiry will be different from the previous chapters. Despite the fact that in the previous three chapters we have been searching for the proper contraries that define change in a part of soul, I am not going to limit our inquiry in this chapter to the discovery of the contrariety particular to intellect. Why? Because that contrariety is well known and uncontroversial: the intellect changes from the privation to the having of a universal form. What I will do instead is to limit the scope of our inquiry by focusing on what it means for the forms of sensation to be “particular” as opposed to the forms of intellection which are “universal.”

I am focusing on this question for a few reasons. First, my discussion in the last chapter generates a real problem regarding the difference between perceptual and intellective forms. After all, forms received in sensation are received “without matter” and I have shown that this does not require any physiological change in the sense organ. So, if there is a difference in kind between the matter-less forms of sensation and of intellection, I need to make that difference clear. Second, I have decided to focus on the forms of sensation because I think that the notion of universal forms is clearer than the notion of particular forms. Third, clarifying what makes a form particular as opposed to universal will be sufficient to make the distinction that we need to discern the difference in kind between the contraries of sensation from the proper contrariety of intellection. Again, I must acknowledge that what I will discuss in this chapter will touch upon a number of controversies, but I will studiously avoid those controversies where I can and only address those that I cannot completely pass by. My present goal is not so much to provide a new approach to engaging with those controversies, but to affirm that my method of analysis in the last few chapters continues to be able to explain the mechanisms of change even in the realm of the intellect, where the mechanisms of change are the most difficult to understand.

As a brief aside, let me remark that there is an important question about whether the intellect is supernatural or natural, which would make it an open question whether or not intellectual activity can be categorized as a “natural” change. The basic idea is that if intellection is supernatural, then there is a separate mind that does our thinking for us, which would mean that intellection is not a power of human nature, thus why it is supernatural. The material on these issues stretches back millennia, and I will not be able to address those complicated questions adequately in the short space I have left. I will say for now that if the activities of intellect are properly natural, then there are obvious merits to this investigation. However, even if the activities of the intellect are supernatural, my discussion here is not without value. The views that make intellection to be supernatural tend to be divided into two categories that have their source in Alexander of Aphrodias, but diverged under the influence of Avicenna and Averroes. On the Avicennian reading, the part of the mind that is passive, and therefore deprived

\[364\] Cf. DA II.5 417b18-21. Shields provides a standard reading of this text when he writes: “Aristotle explains the need for external objects in perception by appealing to his dominant practice of understanding perception to range over particulars and thought over universals (APo. 81b6. 87b28-37,87b39-88a7; cf. note to 417a21-b2; Met.1039b28-1040a7, 1087a15-20).” (Shields 2016, 221) In addition, cf. Hicks 1976, 359 and Polansky 2007, 241-243.

\[365\] A good summary of the historical divisions within the debate can be found in Brentano, 1992 and Shields 2016, 312-317.
of the universal, is in the human soul and so the human mind is really receptive of universal forms. However, the source of these universals is a separate intelligence called the Agent Intellect, which gives to human minds the forms of intellecction. So, the source of universal knowledge is supernatural on this view, while the act of understanding is semi-natural, since there is a form/privation contrariety that results in human understanding.\textsuperscript{366} The more extreme view of Averroes makes both the Agent and the Potential Intellects to be separate intelligences. Humans are said to “think” only because the divine minds think in us through what is called the “passive intellect.”\textsuperscript{367} Averroes’ view makes the form/privation contrariety to be between supernatural minds, and we humans merely share in that thinking process.\textsuperscript{368} While both of these views make the intellect to be supernatural for humans, we can still categorize the activity of intellecction as a natural activity of the mind(s) to which it belongs. After all, on all the supernaturalist views there is a clear distinction between an Agent and a Patient Intellect. Alexander, Avicenna, and Averroes all account for this distinction precisely because they know that thinking is a change between the having and the privation of a form. As a result, even the thinking of a non-human, non-material separated intellect would still fit into the general structure of natural change outline in the argument of Phys. I.5-7.\textsuperscript{369} That being said, I will state for the record that it is my view that in Aristotle intellecction is a power of human nature, for otherwise it would be hard to understand why this activity is discussed in a work otherwise devoted to the soul.\textsuperscript{370} I will, therefore, continue my investigation in this chapter under the assumption that intellecction is a natural human process like the other activities of soul we have investigated in this dissertation.

To that end, my investigation in this chapter will proceed in the following way. First, I will motivate the problem by highlighting the similarities between sensitive and intellecctive forms. Second, I will show that Aristotle labels sensitive forms “particular” and intellecctive forms “universal.” Once this has been established, the third thing I will do is to explain what “particular” means in Aristotle’s ontology. To help make this distinction, I will use the distinction between arithmetic and formal unity, which is articulated in Met. X.1, to define the difference between an object that is particular and an object that is universal. Fourth, I will further clarify the notion of particularity in reference to related discussions in the literature that create problems for my view. Lastly, I will use the discussion of particularity to clarify the meaning of universality and how the intellect identifies universals. What we will see is that

\begin{itemize}
  \item This is by far the more common supernaturalist view among our contemporaries. For example, cf. Caston 1999; Burnyeat 2008; Johansen 2013, 238-239.
  \item Cf. Brentano 1992, 316-318.
  \item This is not a view widely adopted by our contemporaries. It is unclear to me why, if the act is totally supernatural, there still needs to be a form/privation contrariety. Averroes makes it so because Aristotle talks about an Agent and a Potential intellect. This fact, to my mind at least, suggests that it really should be taken to be a natural phenomenon.
  \item Including a separated intellect that is the subject of intellecction would require that we add a step to the scala naturae to include this separated intellect. This addition would not greatly disrupt my project, it would simply extend it. However, because I reject the views of Alexander, Avicenna, and Averroes on this point, I will not do so.
  \item Cf. Shields, who remarks that the supernaturalist approach “is, inter alia, out of keeping with the pervasively naturalistic and biological tenor of De Anima, which treats human beings as natural, rational, or corporeal beings.” (Shields 2016, 315) The supernaturalist reading also entails that intellect is not an activity of soul which would make the discussion strange in a work dedicated to the study of the soul. Shields writes about the supernaturalist view, “On this general approach . . . the active reason Aristotle finds cause to characterize in this chapter as deathless and everlasting is not a faculty of human beings at all, and so has nothing to do with the apparent qualification of De Anima II.1.” (Shields 2016, 313)
\end{itemize}
particular forms and universal forms are different in kind, and therefore the soul’s activities that engage with these forms must also be different in kind.

5.2: The similarity between the objects of sensation and intellection

To begin, I need to motivate my investigation by highlighting the similarity between the objects of sensation and intellection. What is that similarity? The similarity is that all activities of mind operate using forms without the matter naturally associated with those forms. As we saw in the last chapter, the sensitive powers are distinguished from the vegetative powers because they receive forms without matter. The intellect also receives forms without matter. There is a difference in the activity of the operation; the senses engage with a body and receive the form of that body immaterially, whereas the intellect engages with matter-less forms, not with a body. But this distinction in the activities is not sufficient to distinguish the activities in kind. Why? For the simple reason that the imagination, which receives forms from the senses and not directly from a body, also operates using matter-less forms without directly receiving those forms from bodies. If the contrariety of intellection were just another case of not-having or having a matter-less form, then there would not be a difference in kind between the activities of intellect and imagination. Now Aristotle clearly thinks that the imagination is different from the intellect and part of the sensitive soul. So, in his view there must be a difference in kind between the matter-less forms that are objects of the imagination and those that are objects of the intellect. But what is the difference in kind? To answer that, we must first understand the similarity better and then we will be in a position to grasp the specific difference.

The location where Aristotle compares and contrasts the objects and activities of sensation and intellection most clearly is in DA III.8, where he summarizes his discussion of intellect up to that point and explicitly compares the two faculties. So, it is fitting that we begin there and then go back and unpack its meaning with reference to the previous texts it is summarizing. In DA III.8 Aristotle begins by saying that there are different onta for the intellect and sensation: “let us say again that the soul is in a sense all existing things (ta onta panta); for what exists is either objects of perception or objects of reason (aisthēta ta onta è noēta); and knowledge is in a way the objects of knowledge, and perception the objects of perception.”

Our first inclination might be to think of “existing things” or “existing objects” (ta onta) as substances or, in the more whimsical contemporary terminology, “medium sized dry goods.” But Aristotle seems to be referring to something other than just medium sized dry goods when he talks about ta onta of knowledge and perception. These different onta are actually different kinds

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371 I will be using “mind” as an ambiguous term which can refer to both the activities of the sensitive soul and the activities of the intellective soul.

372 This is not the only way to construct the similarity between human activity and beast activity. One could look at the way that some animals seem to express human-like actions, and that drawing a too strong line between the two seems artificial. This approach is taken by Rowett 2007, chapter 4. I am framing the similarity in terms of Aristotle’s own theoretical apparatus, showing that there are questions stemming from Aristotle’s own theory as to whether or not the forms utilized in the form/privation contrariety of imagination actually differ in kind from those in the form/privation contrariety of intellection.

373 “Further, every case of belief implies conviction, while conviction implies being persuaded, and persuasion implies reason (λόγος); yet among the beasts some have imagination, but none has reason (λόγος).” DA III.3 428a22-24. Ross casts doubt upon this sentence because it is absent in our current codices, but it is well attested among the ancient commentators, and so, with Shields, I accept it as authentic.

374 DA III.8 431b21-23.
of form. Note the distinction he makes only a few lines later: “It is necessary that [these objects] be either these things themselves or their forms (auta è ta eidē einai). It is certainly not the things themselves, however: for the stone in not in the soul, but rather its form. Consequently, the soul is just as the hand is; for the hand is a tool of tools, and reason (nous) is a form of forms (eidos eidōn), and perception a form of the objects of perception (eidos aisthētōn).” It is the fact that both kinds of onta are forms that I want to highlight. In the quoted passage he first distinguishes between the things themselves (auta) and the forms (ta eidē). The things themselves are not onta of knowledge and sensation. Ta onta of sensation and knowledge are different forms, namely forms of perception (eidos aisthētōn) and forms of forms (eidos eidōn). Then, to clarify these different activities, he makes a comparison to the operation of the hand. What makes the hand a “tool of tools” is that it is a tool, i.e. organ, of the body that uses other tools. The hand is not limited in its uses to what the fingers can do. Rather, when the hand takes up a foreign tool, it is able to perform the function of that tool. This is, in a way, the hand being actualized by the tool, for the foreign body gives its abilities to the hand, and thus making the tool a temporary extension of the body. In the case of sensation and the intellect, both are “forms” in this way, i.e. they are actualized by the forms they receive. But they differ in that sensation receives actuality only from the sensible forms, whereas the intellect is actualized by some general type of “form.” In the manner just described, the senses are “forms” of sensibles in the body and the intellect is the form of the forms impressed upon it. That ta onta are different is clear in this passage, but that the different onta are different kinds of forms is not as obvious.

That we receive forms in sensation is made clear when we consider the operation of the imagination. Aristotle writes:

(I) (a) Since there is nothing beyond perceptible magnitudes, as it seems, nothing separate, the objects of reason are in perceptible forms, both those spoken of in abstraction and all those which are states and affections belonging to the objects of perception. (b) And because of this, one who did not perceive anything would neither learn nor understand anything, and (c) whenever one contemplates, one necessarily at the same time contemplates a sort of image; (d) for images (phantasmata) are just as perceptions (aisthēmata) are, except without matter.

The meaning of this passage is not uncontroversial. Much of the debate concerns the meaning of (I)(b)—(c), i.e. how much and in what way intellectual activity is dependent upon phantasiai.

375 Referring to τὰ ὄντα ή νοητά as “objects” can, of course, be misleading, but as a translation it seems necessary for indicating the ambiguity of the phrase, for the phrase seems both to indicate the medium sized dry good and the immaterial form abstracted therefrom. I am going to keep the translation as “objects” because that seems to be the best way to describe these ambiguous entities in English. But when I can, I will refer to these mysterious object as ta onta in the body of the text. Just be aware that when I do use the phrase “objects” in the context of my argument, it is generally meant to indicate whatever it is that Aristotle means by τὰ ὄντα.

376 DA III.8 431b28-432a3. Johansen is right to insist upon the fact that both sensation and intellect receive forms. He writes: “It should be stressed immediately that distinct ‘objects’ have to be understood in terms of the different forms. So in the discussion of the relationship between perception and the intellect Aristotle stresses that while intelligible forms may belong to the same objects as perceptible ones, they are nonetheless, as intelligible, different.” (Johansen 2013, 177)

377 DA III.8 432a3-10. The emphasis is mine.

378 For a variety of views on this question cf. Wedin 1988; Polansky 2007, 497-499; Caston 2015; Johansen 2013, 221-245; Cohoe 2014. In general terms, there are those who consider imagination as essential for Aristotle’s notion of understanding and emphasize the idea that there is no thinking without an image. This view can be cashed
However, that debate is orthogonal to my consideration here.\(^{379}\) Fortunately for us, there is a fairly broad agreement among the combatants about (I)(a): the intellective forms are somehow in the perceptible forms. This means that I do not need to commit to a view about (I)(b)—(c).\(^{380}\) Instead, I just need to explicate the meaning of (I)(a) in order to understand the difference between forms of the intellect and forms of sensation. If we can understand that, then we will be able to see how the activity of the intellect is of a different kind than that of the senses.\(^{381}\)

We have seen so far that \textit{ta onta} of sensation and intellection are both forms. Another similarity that needs to be highlighted is that the forms of sensation and intellection are both \textit{logoi}. While it is clear that Aristotle does talk about “forms” of sensation and intellection, he more often discusses these same \textit{onta} as \textit{logoi} instead of forms (\textit{eidē}).\(^{382}\) In fact, “\textit{eidos}” only appears a handful of times in all of the \textit{DA}, and a significant concentration of those occurrences are in \textit{DA III.8-9}. Yet, it is clear that when Aristotle is talking about \textit{logos} he often means a form (\textit{eidos}). This interchangeability is made clear in two passages from \textit{DA II.2} where he also uses the term \textit{eidos}:

\begin{itemize}
  \item \textbf{(II)} On one of these ways of speaking, knowledge and health is each a shape (\textit{morphē}), a sort of form (\textit{eidos}), an organization (\textit{logos}), and so as to be an actuality of what is capable of receiving them.\(^{383}\)
  \item \textbf{(III)} Consequently, the soul is in the primary way that by which we live and perceive and think, so that it will be a sort of organization (\textit{logos}) and a form (\textit{eidos}), but not a matter and a substrate.\(^{384}\)
\end{itemize}

In these related passages, Aristotle uses \textit{logos} and \textit{eidos} interchangeably to describe what the soul is. This connection between \textit{eidos} and \textit{logos} is further supported by a passage from \textit{Phys. I.7}. As we are familiar with from my discussion in earlier chapters, in \textit{Phys. I.7} Aristotle makes an argument that all change happens between form and privation. In discussing form, Aristotle clarifies what he means by “form” in the following way: “By ‘in form’ (\textit{eidei}) I mean the same as ‘in account’ (\textit{logōi}).”\(^{385}\) This is a very clear identification. What is more, in the very passage of \textit{Phys. I.7} where Aristotle says that change happens between form and privation (191a12-14),

\begin{itemize}
  \item 414a 8-10.
  \item 414a13-14.
  \item 190a16-17.
\end{itemize}

\(^{379}\) This debate is orthogonal to my consideration here because I am focused on how the contraries of imagination and intellection are different. This difference should be discernable in Aristotle’s thought whether or not the intellect can think about immaterial objects without images.

\(^{380}\) I would only need to commit to a view in that debate if this chapter were considering the nature and activity of intellect. But we are engaged in a discussion about the objects of intellect and sensation, and so I need not stake out a position in that debate here.

\(^{381}\) That is not to say that my view does not have any implications for the debate about how the intellect understands immaterial objects. However, I am going to save that consideration for another time.

\(^{382}\) Sometimes translators will render \textit{λόγος} as “form,” which can add to our confusion.

\(^{383}\) Cf. Wedin 1988, Polansky 2007, and Caston 2015. Others, like Johansen, understand Aristotle to hold that the intellect can understand without images, but only with respect to non-physical objects, like the first mover: “The prospect is raised, then, that such thinking of immaterial intelligibles can itself occur without any bodily preconditions.” (Johansen 2013, 236-7)

\(^{384}\) DA II.2 414a 8-10.

\(^{385}\) Phys. I.7 190a16-17.
The primary purpose of this passage is to explain why we can think whenever we want but cannot sense whenever we want. But for our purposes we must take note of the difference between the objects of intellect and the objects of sensation: sensation is of particulars (kath’ hekaston) and intellection is of universals (tōn katholou). So, when I sense gold, I am not just sensing some abstract color. Instead I am sensing a particular golden hue, say of a dog’s fur (call her Amber). This form is received in all its particularity, presented as blurry and soft because of the nature of fur, and is also presented with other less obvious features as well. In a sense we can

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386 Cf. Ross 1936. Bonitz and the Oxford translation accept a variant that has “τὸ ἐίδος ἢ ὁ λόγος” but Ross, Bekker, and Torstrik reject that reading.

387 While Aristotle does use the terms interchangeably in many places, he does appear to use them in different contexts to bear different senses. Often when he uses “λόγος” he is indicating something like the form as definition or essence of a thing or kind. This use of λόγος identifies the intelligible content of a form. His use “ἐίδος” is often used in the same contexts where it is opposed ὄλη (cf. DA 403b2; 412a8-10; 414a10-17; 424a18; 432a2-5). In many of these usages, Aristotle indicates that the ἐίδος is the ἐντέλεσις of some thing (cf. 412a-10; 414a10-17). It seems to me that, on the one hand, when Aristotle uses “ἐίδος,” he intends to convey the notion of the form as a cause or actuality of a thing. On the other hand, when Aristotle’s uses “λόγος” he intends to convey the notion of the form as essence or definition.

There are cases where “ἐίδος” is used in reference to the definition or essence of a thing (cf. DA 411b21 and 415b7). In these usages, “ἐίδος” is referring to the species as opposed to the genus. This does not necessarily take away from the distinction between “ἐίδος” and “λόγος,” because in these cases it is clear that “ἐίδος” is opposed to “ὄλη,” but in the usages where “ἐίδος” is the species, it is opposed to the genus. The upshot is that when “ἐίδος” and “λόγος” are used interchangeably to refer to the opposite of matter, then the different senses I outlined above are consistently applied.


389 DA II.5 417b18-27.
say that the particular form is a *fully determined* form that is presented to the senses with these other determining features. The universal form, on the other hand, is *undetermined* with respect to these other features. Determination and lack of determination is key. As Aristotle says in *Met. XIII.10*, the universal is indefinite in the way that matter is indefinite: it is in potency. Without further actualization (i.e. determination), these universals cannot exist because they are not substances. Only when they are actualized in a particular substance, and therefore fully determined, can they exist actually and not just potentially. But when they are so actualized, these particular instantiations then have a necessary relation to the other accidental qualities of the substance in which it inheres. I will speak more about this in a minute. For now, we can simply state that the form is particular and fully determined in this manner.

With respect to these particular forms, the matter-less particular golden hue of Amber then becomes the object of imagination in all its particularity, whether that phantasm (i.e. the form in the imagination) be a clear representation or a fuzzy one. It is the phantasm that renders the form of the perceptible particular permanent in the mind in a matter-less way and makes it an object of the action of the intellect. More to the point, it is the particularity of the form in the imagination that identifies that form with the object sensed. But what does this particularity amount to? That is what we will investigate next.

5.3: What makes a form “particular”

What is the difference that particularity makes to the forms of sensation? The difference is that the forms in the senses are unified in a way that the forms of the intellect are not. What do I mean by this statement? To answer that, it will be helpful to go back to *Met. X*. In *Met. X.1* Aristotle distinguishes different ways a thing can be one or indivisible, and he says in *Met. X.2* that “the one in some sense signifies the same as being.” It seems uncontroversial to say that for Aristotle being one in account (*logos*) is also the same as being a subject of some sort. Now, in *Met. X.1* Aristotle says that there are two ways a thing can be one in account (*logos*): in number and in form. This distinction does not mean that the being one in number is the result of some *logos* that is not a form. Rather, I think that Aristotle is distinguishing between kinds of forms, i.e. particular forms and universal forms. Note what he writes:

(V) Other things are one if their account (*logos*) is one, and things of this kind are those of which the thought is one; and things of this kind are those of which the thought is indivisible, and a thought is indivisible which is of what is indivisible in form or in number: and the particular (*kath’ hekaston*) is indivisible in number, while what is indivisible with respect to what can be known and knowledge is indivisible in form, so that the cause of the one for substance would turn out to be a primary one.

What is interesting about this passage for our purposes is that Aristotle clearly associates being particular with being indivisible (or one) in number (i.e. being an individual subject). It seems reasonable to presume that universals, then, are one in form. The forms that are received into the senses without matter are forms of something that is one in number. That means that when I see

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391 Cf. *DA III.3* 428b30-429a7; *DA III.7* 431a14-17.
393 *Met. X.1* 1052a29-34.
Amber, the gold received by my eye is not just “gold,” but “Amber’s gold,” as I mentioned above. When my eye takes in the glittering splendor of St. Mark’s Cathedral in Venice, my eye sees the “Gold of St. Mark’s Cathedral.” Thus the forms of the sensation are forms of individual things, and are one in number with that individual thing. Because these sensible forms are one in number with the individual things we sense, that means that the form is fully determined and actualized in that individual thing. When the particular form is received by our senses, the sensible form has the same particular determinations as those found in the individual with which the form is one in number. Otherwise, it would be universal and not particular. It is this arithmetic unity with the sensed object as a whole that makes the forms of imagination and sensation forms of particulars. It also means that the forms of intellection are somehow pulled apart from the individual forms, losing the non-essential determinations they have as individual forms. The unified object of the form of intellection is some abstract and undetermined entity with formal unity, rather than the arithmetic unity which fully determines the particular form. I will expand on what “formal unity” means below, but first let us get a firmer grasp of what it means for a form to be “particular” and an “arithmetic unity.”

The arithmetic unity that the forms of sensation and imagination have with the concrete particular from which they come gives us a clue about why Aristotle thinks that the forms of intellection are in the sensible forms. Take Amber’s-golden-hue. When we engage in an act of sensing, we do not receive the universal “gold.” Instead our eyes have the form of “Amber’s gold.” What is the difference between the universal “gold” and “Amber’s gold”? Amber’s gold comes to the eye as determined in relation to other properties of Amber. This gold that I perceive is also (i) the gold of a dog, (ii) the gold of fur, (iii) the gold of a golden retriever, (iv) the gold of an animal that is 14 years old, etc. What brings about these determinations in Amber’s gold is the fact that all of these properties subsist in one and the same subject. Arithmetic unity just is

394 As Aristotle says in Met. XIII.10 1087a16-21: “Potentiality, being (as matter) universal and indefinite, is of what is universal and indefinite, but actuality, being definite, is of something definite, and being individual, is of an individual. It is <only> incidentally that sight sees universal color, because this <individual> color which it sees is a color; and the grammarian’s object of study, this individual A, is an A.” (Translation is Annas 1976). The Greek text is: ἡ μὲν οὖν δύναμις ὡς ὕλη [τοῦ] καθόλου οὖσα καὶ ἀόριστον τοῦ καθόλου καὶ ἀόριστον ἐστιν, ἐν δὲ ἐνέργεια ὑφιστάμεναι καὶ ὑφιστάμενοι, τάδε τι οὖσα τοῦδε τινος, ἀλλὰ κατὰ συμβεβηκός ἡ ὑπὸ τοῦ καθόλου χρῶμα ὁρᾶ ὑπὸ τὸ χρῶμα ὁ ὄρθο χρῶμα ἐστιν, καὶ ὁ θεωρεὶ ὁ γραμματικός, τάδε τὸ ἄλφα ἄλφα.

395 It is unfortunate that I have to talk about “formal unity” as opposed to “arithmetic unity” when both types of unity are “forms.” This ambiguity, however, cannot be helped, because Aristotle himself uses the phrase “τοῦ ἀδιάφρυτου ἐπεὶ ἡ ἀριθμημένον,” and so I will continue to use the ambiguous language to reflect the ambiguity in Aristotle’s own language. Despite this ambiguity, it is nevertheless clear that the arithmetic unity is a particular form and the formal unity a universal form.

396 I am being intentionally ambiguous by using the term “subject.” Any further specification of what that means would mean trespassing into at least one, if not several, strongly debated issues. For one, it could mean getting into a discussion about prime matter, for some think that the elements are the ultimate subjects of subsisting properties and others think it is some purely potential subject called “prime matter” (To list a few articles in this debate, cf. King 1956; Solmsen 1958; Sokolowski 1970; Robinson 1974; Charlton 1983; Cohen 1984; Graham 1987; Byrne 1995; Scharle 2009; Krizan 2016). It also brings up questions about individuation, which was a heated topic of debate in the middle ages and even today. For example, Thomas Aquinas argues that the principle of individuation is determinate matter (Cf. Thomas Aquinas De ente et essentia, chapter 2; In De anima II, lect. 24; ST III q.77, a.2). Scotus, and Suarez following him, posits the notion of “haecceity” as the principle of individuation (Cf. Scotus, Ordinatio II, d.3, p.1, q.4, n.76). There are, of course, discussions about individuation in the contemporary literature as well, which I will not wade into even here in the footnotes. The immense literature on these topics permits me to refrain from specifying the “subject” any further. I will say, though, that I think Aquinas’s interpretation of the principle of individuation as dimensive quantity is probably the closest to what Aristotle actually thought. I will have to argue for that position at another time.
unity in a subject, and the further determinations of the particular form are a result of other forms subsisting in the same subject. The common subject of these otherwise unrelated properties unites them all as one individual thing. Because the gold that is perceived just is the gold predicated of some subject that is a dog and has fur, we can truthfully predicate of that form all the properties that belong to the subject we are perceiving when we perceive the form.

One might object that I am reading too much into the notion of arithmetic unity in a subject when I say that the other properties of the perceived subject can be truthfully predicated of the sensible form. One may wonder where Aristotle articulates such a claim. He does not state this claim as explicitly as I do, but it is implicit in things that he does write. For instance, let us look back at *Phys*. I.5. Aristotle’s argument there insists that natural change must happen between proper contraries that are essentially related to one another. However, he also allows that accidental change happens between things that are not proper contraries insofar as they are both properties of the same subject: “Our first presupposition must be that in nature nothing acts on, or is acted on by, any other thing at random, nor may anything come from anything else, unless we mean that it does so accidentally. For how could white come from musical, unless musical happened to be an attribute (sumbebēkos) of the not-white or the black?”\(^3^9^7\) Accidental predication is not false, it is just not essential. As we saw, in *Phys*. I.5 Aristotle is identifying essential connections in change, but he presumes that accidental predication can be true and can also muddy the waters of our understanding of change. In a way, the white really does come from the musical insofar as the non-white thing is also a musical thing, i.e. they are properties of the same subject.

This last point may seem tangential, but something like it must be true for us to have incidental perception. Whatever faculty perceives incidentally, what that act of perception does is identify a connection between properties that is non-essential. So, when I sense this piece of chocolate, I sense that this milky brown thing is also this sweet thing. Or, to use the example Aristotle gives, when I see a particular white object I also perceive that it is the son of Diaries:

(26) Something is said to be an object of perception co-incidentally (kata sumbebēkos) if, for example, the white thing should be the son of Diaries. There is co-incidental (kata sumbebēkos) perception of him, because he coincides (sumbebēke) with the white thing, of which there is perception. For this reason, one is not affected by an object of perception insofar as it is such a thing as the son of Diaries.\(^3^9^8\)

The only explanation for why this is possible is that the forms received into the particular senses have, as part of their non-essential determinations, the forms of the other properties that belong to the subject being perceived. In the case of the chocolate, the milky brown subject is also

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\(^3^9^7\) *Phys*. I.5 188a32-36. The emphases are mine.

\(^3^9^8\) *DA* II.6 418a20-24. Thomas Aquinas says the following regarding incidental perception: “Having seen how we should speak of the absolute or essential sense-object, both common and special, it remains to be seen how anything is a sense-object ‘incidentally’. Now for an object to be a sense-object incidentally it must first be connected accidentally with an essential sense-object, as a man, for instance, may happen to be white, or a white thing happen to be sweet. Secondly, it must be perceived by the one who is sensing; if it were connected with the sense-object without itself being perceived, it could not be said to be sensed incidentally. But this implies that with respect to some cognitive faculty of the one sensing it, it is known, not incidentally, but absolutely. Now this latter faculty must be either another sense-faculty, or the intellect, or the cogitative faculty, or natural instinct. I say ‘another sense-faculty,’ meaning that sweetness is incidentally visible inasmuch as a white thing seen is in fact sweet, the sweetness being directly perceptible by another sense, i.e., taste.” (*In DA* II, lect. 13, n.395)
sweet, so when we perceive the color of the milky brown we can perceive that this brown subject has other determinations, e.g. sweetness. This must be true if we are to perceive “the son of Diaries,” since the “son of Diaries” is not a proper sensible. We can perceive “the son of Diaries” in the proper sensibles only if the various properties are one in some sense, which they are because they are properties of the same subject.

These sensible forms are matter-less when received by the senses, but they nevertheless have the information related to the matter of the subject encoded within them. Thomas Aquinas phrases it this way: “For as things exist in sensation they are free indeed from matter, but are not without their individuating material conditions.” As I read him, the “individuating material conditions” are the forms inhering in the subject that are not the proper sensible being sensed by a given sense faculty at a given time. For example, according to Aristotle color is either “in the boundary (en τοί perai) or is the boundary (peras).” The nature of the boundary is not defined by the essence of the color gold. But, in fact, when we perceive Amber’s gold we perceive it as inhering in fur as the boundary of the canine body. The furiness of the gold is a further determination of the gold since gold must inhere in some boundary, but that determination comes from the subject of the gold color and not the essence of what it means to be gold. In this way, the incidental perceptible form of “fur” is in the proper perceptible “gold” as an individuating material condition of the property gold as it inheres in Amber. The other forms belonging to the individual from whence they come are in the particular sensible forms precisely because they are forms of a particular subject, like Amber.

This reading of “particular form” helps to make sense of a mysterious passage in DA III.7. The passage states:

(VII) (a) What it is by which one discriminates (epikrīnei) how the sweet and the hot differ (diapherei) has been said earlier, but one must [also say this] (lekteon de kai hōde).
(b) For there is something one, as a boundary is such (houtō de hōs ho horos), [and these are one by analogy (hen tōi analogon). Also what is one in number (arithmōi) has a relation to those as they are in relation to one another].
(c) For what is the difference between puzzling how one discriminates (krīnei) things not of the same kind and opposites, like white and black? (d) Let A, the white, stand in relation to B, the black; and let C stand in relation to D, as those are in relation to one another, [with the result that they are convertible] (hōste kai enallax). (e) If, therefore, CA were to belong to one thing, so this will be in the same condition (houtōs hexei) as that to which DB belongs: though one and the same, their being would not be the same—and similarly with respect to those. (f) The same account (logos) would hold if A were the sweet and B the white.
This passage is difficult to understand, but my reading of particular forms can bring light to this rather obscure text. It first must be noted that the context of this passage is a discussion of sensation and imagination and what happens in those activities. (VII)(a) then brings us back to an earlier discussion of how one discriminates between two qualities that belong to different senses, i.e. sweet and hot. This appears to be a reference to the discussion about how we distinguish between sensations proper to divergent senses in DA III.2 426b8-427a14. Most scholars use that passage to interpret the meaning of what follows in text (VII). But there are some oddities that make the passage difficult to understand if that were the case and, what is more, Hicks would be right in noting that this discussion does not add anything to that earlier discussion, and so would seem to be superfluous. I think that when Aristotle says “but one must [also say this] (lektein de kai hōde)” he is not promising to repeat what he has said earlier. I think he is indicating with this phrase that he will explain why the original question was so problematic: because it appears to be the case that the forms of sensation really are arithmetically one in the object from which the sensation comes. That would mean that the same arithmetically one object can be both contraries. A careful look at this passage will show why I think this reading is the correct one.

In text (VII)(b), Aristotle starts by indicating that there is one thing (read: one subject) which makes the two properties of sweet and hot one object by analogy. The analogical unity is likely expressed in the following way: sweet is one with its subject; hot is one with the same subject; therefore sweet and hot are one. The analogy depends on the fact that both properties inhere in one and the same subject. It is by virtue of their unity with the subject that they are one with one another. This must be so for, as Aristotle asks in (VII)(c), why else would we be worried about how to distinguish the two properties if they were not one in some way? If there is some confusion about how sweet and hot can be different, then there must be a reason why we would think that they are not different. This reason can only be supplied by the fact that they are, in some way, united with one another. That unity can only be expressed by arithmetic unity, which is unity in the same subject.

Notice that the question in (VII)(c) is identifying the motivation for the worry this passage is addressing, since without the arithmetic unity in the subject there would be no worry about change between contraries, like the change between white and black. Aristotle explains in (VII)(d)-(e) why the unity of the properties black and white in a subject generates the problem of change between contraries. Take two contraries, white (A) and black (B), and then take two unnamed contraries, C and D. The contraries C and D also “convert/alternate” (enaΔλαξ) between

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note that the manuscript variants do not undermine the position I am about to endorse. Most of those variants only make superficial modifications to the example while leaving the general point intact. However, there is one substantive variant that would pose a modest problem for my reading. In (VII)(b) the translation “things not of the same kind,” the textual question is whether the “not” (μὴ) is or is not part of the original text. The manuscript tradition is split on this, but some of the best manuscripts have it. Including it makes better sense of the text on all plausible readings of the passage, so it seems appropriate to keep it.

There is the added question about whether this entire passage is an interpolation or not. As Shields notes, any attempt to trace it back to a scholiast will be conjectural at best (cf. Shields 2016, 339), so we have no way of knowing. The passage seems to me to be from the pen of Aristotle, and since most texts include it, it therefore seems reasonable to use it to illustrate my point. However, I should say that my argument does not depend on whether or not this text is from the pen of Aristotle. I developed my reading of the text apart from it and have found this passage as a useful illustration of my point. If it turns out that the passage is indeed an interpolation, my reading will not fall as a result of such a discovery.

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405 Cf. Hicks 1976, 531. Pace Polansky, who does his best to show how it could add something.
one another just as white and black do. When change occurs the same thing will be both AC and
the contraries BD, which would be a problem without some explanation for why time makes a
difference. He responds to this problem by distinguishing between the subject and the being of
the subject, by saying that one and the same subject has different ways of being (to einai ou to
auto). Aristotle then concludes in (VII)(f) that the same question about difference arises even if
the alternation between A and B is not between co-contraries, but also between sweet and white.
My reading of this passage makes the aporia to be a worry about how arithmetically one and the
same subject can have different properties at different times. This is clearly a problem when
those properties are contraries, but it is also a problem even if the properties were not-contraries.

My reading of this passage is unusual, but if I am correct and Aristotle is explaining why
there is a worry about how to distinguish properties found in different senses, it is because those
properties are one in number with the form of individual in which they are found. Only once
we recognize that there is an arithmetic unity between the sensible properties precisely because
they are identified with one and the same individual, does the problem of differentiation arise in
the first place. Thus, even though the being of these properties is different, they are all the same
in the particular form insofar as they are forms of some individual thing in which they subsist.

What does text (VII) do for my argument? It shows that Aristotle presumes that forms
that are otherwise unrelated are related by necessity when they are one in number as a result of
being instantiated in the same subject. It is this arithmetic unity between different sensible forms
that allows Aristotle to say that the incidental sensibles as well as the universal forms are all in
the forms received by the special senses. This arithmetic unity of the sensible forms with their
subject and with one another is what makes them particular.

Let me summarize our investigation into particular forms so far. The forms of sensation
are particular insofar as they are forms of an individual. The received forms have a natural
relation to other properties in that individual, such that we can truthfully predicate different
sensible forms of one another because they are arithmetically one in the sensed object. In this
way, the other forms of an individual are present in the particular sensible forms. This presence
of other forms in the special sensible forms allows for the sensation of common and accidental
sensibles as well as for the understanding of universals.

5.4: Related questions that further clarify the character of particular forms

Before turning to how universal forms come from and contrast with particular forms, it is
worth noting here that my view is in tension with some commitments related to other debates
about universals and particulars in Aristotle. The first tension is with respect to a question
normally understood as a debate in interpreting the Categories, namely whether or not non-
substantial individual forms can be particular. The second tension relates to the meaning of a
passage from APo. II.19, where Aristotle mysteriously says that “for though one perceives the
particular, perception is of the universal—e.g. of man and not of Callias the man.” I think that
if we pause and situate my view of particular forms vis-à-vis these debates, I will be able to
further clarify my view of particular forms.

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407 APo. II.19 100a16-100b1.
5.4.1: Can non-substantial individuals be particular?

My view of particularity creates an apparent problem with my commitment to the Is-ing and Having distinction that I endorsed in the last chapter. We can see the problem if we consider a passage in Cat. 2 about when something is in a subject. The passage in question states: “Some are in a subject but are not said of any subject. (By ‘in a subject’ I mean what is in something, not as a part, and cannot exist separately from what it is in.)” These properties are often called “non-substantial individuals,” and are properties like “Amber’s gold” and “the white of the Taj Mahal.” The interpretive question around which the debate revolves is whether this definition of non-substantial individuals allows them to be repeatable. As Mehmet Erginel sums it up: “The traditionally accepted view . . . is that a non-substantial individual is a property that cannot be shared by (be ‘in’) more than one individual substance . . . [but] Owen and Frede have argued that non-substantial individuals are maximally determinate properties, which can be shared by more than one individual substance.” Now, it is worth noting that this is not a debate about the repeatability of individual substances. No one questions whether individual substances are repeatable. The answer is no. The question is whether non-substantial individuals are repeatable or not. Some say yes, others no.

Here is how this debate relates to the particularity of sensible forms: whether or not non-substantial individuals are repeatable partially depends on what kind of objects count as particulars. The question of repeatability is joined with the question of particularity. For those who say that non-substantial individuals are repeatable, then individuality and particularity are distinguishable such that repeatable non-substantial individuals are not particular. If non-substantial individuals are not repeatable, then they are particular. Verity Harte argues for this latter position by pointing out that the unique feature of substances that makes them non-repeatable individuals is that they are particular. She also shows that non-substantial individuals satisfy the same criteria for particularity. From these two conclusions, she claims that there is strong evidence in favor of the traditional view that non-substantial particulars are not repeatable. What this means for our purposes is the following: if non-substantial individuals are repeatable, then they are not particular; if non-substantial individuals are not repeatable, then they are particular. Harte’s arguments have convinced me and so my view about particular forms also commits me to the view that non-substantial individuals are non-repeatable. Whether or not the traditional interpretation of the Cat. 2 is the correct one, at the very least I am committed to the idea that Aristotle endorses the traditional view of the non-repeatability of non-substantial individuals in his mature works.

That may seem like a minor point, until we consider that Code endorses Owen and Frede’s view as Aristotle’s mature position and writes it into the logic of his distinction between Is-ing and Having. When Code defines I-predication (Is) and H-predication (Has), he explicitly states that I-predication is essential (kath’ hauto) predication and H-predication is accidental.

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408 Cat. 2 1a23-25. τὰ δὲ ἐν ὑποκειμένῳ μὲν ἐστὶ, καθ’ ὑποκειμένου δὲ οὐδενὸς λέγεται, — ἐν ὑποκειμένω δὲ λέγω ὃ δὲν τινὶ μὴ ὡς μέρος ὕπαρχον ἀδύνατον χωρὶς εἶναι τοῦ ἐν ὃ ἐστίν.
412 I should note Frede concedes that his interpretation of Cat. 2 1a23-25 is not the position Aristotle holds in later works. Cf. Frede 1983, 63-71. That is why I am not presenting my position as a reading of Cat. 2, but only that I am drawing from some of the discussions to help understand the metaphysics of non-substantial individuals.
(kata sumbebekos). He appears to mean by this distinction that individuals are their substantial properties but have their non-substantial properties. Now the forms received into the senses are all forms of non-substantial properties. Since Code endorses Owen and Frede’s view about non-substantial individuals, he is committed to the possibility that non-substantial individuals are in theory repeatable. Therefore, the sensible forms cannot be particular forms according to Code’s logic of Is-ing and Having, since the sensible forms come from repeatable properties. That is a problem for me, since my view of sensation, as presented in the previous chapter, is committed to this distinction between Is-ing and Having and my view of sensible forms in this chapter is committed to the idea that they are particular.

Fortunately for me, I only have to reject Code’s definitions of I-predication and H-predication. I can still endorse the formal principles governing I-predication and H-predication that shape the logic of Is-ing and Having. These fundamental principles are as follows:

**FP1:** X Is X
**FP2:** if (X Is Y and Y Is Z), then X Is Z
**FP3:** if X Has Y, then it is not the case that X Is Y
**FP4:** X Has Y if X Has something that Is Y

As I said above, Code defines I-predication in terms of essential properties and H-predication in terms of accidental properties. In what follows I am going to offer a different definition of I-predication and H-predication that incorporates the distinction between arithmetic and formal unities in *Met.* X.1. What justifies my change in definitions? The first justification is that Code’s distinction between Is and Has only covers “some of Aristotle’s ontological vocabulary,” as Code himself admits. So, if we want a theory that covers a broader swath of Aristotle’s ontological vocabulary, then we should incorporate a more complete division of his ontology into the definitions that we will use in the logic of Is-ing and Having. I think that we get that more comprehensive division in *Met.* X.1. One may object that the topic of *Met.* X.1 concerns how things are one, not how things are. However, Aristotle himself says that “the one in some sense signifies the same as being,” and “being one is being for each thing.” Castelli sums up Aristotle’s argument concerning the identity between “one” and “being” in the following way:

The predication of unity or of being of a subject does not result in the ascription of a new property to the subject. If we say of something that is one man (or that it is one and a man) or that it is a man that is (or that it is and that it is a man) we do not say anything more than when we say that it is a man. The point here is that ‘one’ and ‘being’ behave in the same way with respect to predication and, in particular, that if added to another predicate they do not add anything to the content of that predicate; the composite predicate made out of ‘one’ of ‘being’ and another predicate is equivalent to the other predicate.

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413 Cf. Code 1986, 414, definitions D2 and D3. Further evidence of this reliance is seen in his footnotes, where he rejects Ackrill’s more traditional view in note 7 on the same page.


416 Castelli 2018, 91.
So, the ways things are one are identical with the ways they are, full stop. The second justification for giving new definitions of I- and H-predication is that the division of “one” offered in Met. X.1 not only includes the distinction between formal and arithmetic unities, but also particular and universal unities: “a thought is indivisible which is of what is indivisible in form or in number: and the particular is indivisible in number, while what is indivisible with respect to what can be known and knowledge is indivisible in form.”

Being able to distinguish Is-ing and Having alongside particular and universal objects is central to my project in this chapter. For these reasons, I am going to offer my own definitions of I-predication and H-predication in connection with the division of being in Met. X.1, so that the logic of I-predication and H-predication aligns with my reading of Aristotle’s notion of particular forms. I should note that I will not be providing a full set of definitions and theorems, as Code does. I will be focusing, instead, only on the definitions of I-predication and H-predication.

I am defining I-predication in the following way:

\[ \text{IP}^*: \text{X is I-predicable of Y iff X does not exist independently of Y and is either (a) arithmetically one with the essence of Y or (b) formally one with the essence of Y.} \]

What I have done with this definition is to make it consistent with the Met. X.1 distinction between something that is arithmetically one and formally one. The first clause “X does not exist independently of Y” is a necessary condition for oneness. If X and Y are one, then X does not exist independently of Y. For example, for a hand to be one with my body, it cannot be independent of my body. Likewise for me to be one with my hand, I cannot be independent of my hand. Of course, if my hand were severed I would exist independent of my hand, but it would still be true that I am not one with my hand once it has been severed. So, the first clause governs the unity of the two things. The second clause “and is either (a) arithmetically one with the essence of Y or (b) formally one with the essence of Y” is the primary distinction outlined in Met. X.1. The “or” here is inclusive, which is satisfied even when both (a) and (b) are true of the relation between X and Y. The reference to “the essence of Y” indicates that the properties are further determinations related to the essence. For example, the essential property “body” requires that there be some determination with respect to color, since all bodies have boundaries. A color, say “gold,” determines Y with respect to its essence by providing a further determination of an essential property. Taken together, this definition results in 3 IP*’s:

**Universal Attribute (UA):** X is not independent of Y and
   a. X is arithmetically one with the essence of Y,
   b. X is formally one with the essence of Y.

**Universal Substance (US):** X is not independent of Y and
   a. X is not arithmetically one with the essence of Y,
   b. X is formally one with the essence of Y.

**Particular Attribute (PA):** X is not independent of Y and
   a. X is arithmetically one with the essence of Y,
   b. X is not formally one with the essence of Y.

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417 Met. X.1 1052a30-33.
These are all IP\(^\ast\)'s because in each instance X Is Y because it is one with Y. The names I have given to each IP\(^\ast\) are based on a standard nomenclature common among Aristotelians after Porphyry. As is indicated in the *Met.* X.1 passage, when X is arithmetically one with the essence of Y, this is a particular unity. So, “Amber’s Gold” is arithmetically one with Amber, not as an essential form but as an accidental determination that is particular to this individual dog we call Amber. When X is formally one with the essence of Y, this is a formal (i.e. universal) unity. According to the definitions I have given UA and US are “universal” because they are formal unities. For example, the universal form “dog” is united to Amber because it is part of her essence that she is a particular instantiation of a dog. The predication of UA, where X is also arithmetically one with Y, is different. The form of “gold” is formally united to Amber insofar as “gold” is a universal of the particular form “Amber’s Gold” and so is essentially related to “Amber’s Gold.” The universal “gold” is arithmetically one with Amber by virtue of being formally one with “Amber’s Gold.” UA properties are universal because they can be predicated of multiple individuals, but they are so predicable because they are universals of properties that are arithmetically one with the subject. PA is particular because X is only united to Y arithmetically and so is most properly called particular, since Aristotle says that “the particular is indivisible in number.”

The reader may have noticed that there is still one more logical possibility left for a kind of predication. That is the following:

**Having Form (HF):** X is not independent of Y and

a. X is not arithmetically one with the essence Y,

b. X is not formally one with the essence Y.

As a definition, it is not all that descriptive since it consists of negations. What is more, even though HF denies arithmetic and formal unity between X and Y, it implies another kind of unity since “X is not independent of Y.” This will be a kind of accidental unity. I will not be giving a definition of accidental unity here, because the complications of formalizing such a definition in relation to Aristotle’s mature views on the topic are tangential for what I need to do. All I need to do is to show that H-predicated properties are not “maximally determinate properties” (to use Erginal’s language in the quote above) that are independent of the substances. If they were independent, it would be difficult to see how the essential properties of a substance can be “in” the forms of non-substantial individuals that our senses perceive. The particularity of non-substantial individuals, i.e. the fact that non-substantial individuals are not maximally determined without a particular individual, gives us the necessary connection between non-substantial individuals and the substances that allows the other forms of the substances to be *in* the forms of non-substantial individuals.

With that in mind, we must ask: how does H-predication work? Consider this: I-predication is supposed to be descriptive of a way that a thing “Is.” I take the “Is” here to indicate some sort of condition related to the essence of a subject. So, when I say “Socrates is a man” the universal “man” is predicatable of Socrates as part of his essence. The accidental properties of UA and PA are also related to the essence of a subject, but in an indirect way. For example, as a human Socrates is also a body. It is necessary that bodies, having boundaries, be colored. But the shade of color that Socrates Is is not a determination of his essence, but rather of a particular accident. It is necessary that Socrates have some particular accidental color property.

\(^{418}\) *Met.* X.1 1052a31-2.
but it is not necessary that it be any given color, and may, in fact, change over time. Socrates is the particular color with which he is qualified because he requires some coloration. The accidental properties of UA and PA are related to the essence of the subject by filling out the necessary determinations that the subject requires for existence.

I understand the having properties to be other accidents that fill out possible determinations of a subject, but not essential determinations required for the existence of the subject. This kind of predication is a way in which a subject “has” a property, but “is not” that property, thus why it is a “Having Form.” I formally define it in the following way:

\[ \text{HP}^* : X \text{ is H-predicable of } Y \text{ iff } X \text{ does not exist independently of } Y \text{ but is (a) not arithmetically one with the essence of } Y \text{ and (b) not formally one with the essence of } Y. \]

The four definitions I have provided so far establish the general framework for the logic of Is-ing and Having sufficiently, even if I have not provided a full set of definitions and theorems related to the system. For our purposes here, all we need to note is that my definition of H-predication fits with Code’s four fundamental principles, which I wanted to preserve. If I-predication is restricted to US, UA, and PA, then it is true that FP3: if X Has Y, then it is not the case that X Is Y.

My new definitions, based on Met. X.1, are a marked improvement upon Code’s original theory in a number of ways. The first improvement is that I am able to capture more of Aristotle’s ontological language than Code’s original theory was able to do, while still being able to satisfy the four fundamental principles Code uses to distinguish Is-ing and Having. Second, although my approach is different, I am able to give a principled distinction between essential and accidental properties. Originally Code wanted I-predication to be essential predication and H-predication to be accidental predication. While my HF can be considered an accidental predication, both UA and PA are also accidental predications, which means that accidents can be I-predicable of a subject. I consider this an advantage to my view, not a problem. First because there is still a clear distinction between accidental and essential predication, if we consider arithmetic unity a kind of accidental predication and formal unity as a kind of essential predication. Second, by allowing some accidental properties to be I-predicated of a subject I can account for Aristotle’s worries about predications like “the white becomes musical” from Phys. I.5. He says we can only make those predications when there is a common subject, and so if there is a common subject this type of I-predication can be true. We can see why by virtue of Code’s 2nd fundamental principle, which is the transitivity of I-predication: FP2: if (X Is Y and Y Is Z), then X Is Z. For example: If white Is Socrates (by virtue of PA), and If Socrates Is musical (by virtue of PA), then the white Is musical. Why transitivity works no matter which I-predication we use I will explain in the next subsection. For now it is sufficient to note that my definitions of I-predication and H-predication are able to encompass more of Aristotle’s ontology while achieving the goals motivating Code’s desire to distinguish the way something Is from what it Has.

With my new definitions, I am able to maintain an Is-ing and Having distinction that is not derived from a view committed to the repeatability of non-substantial individuals. However, another question arises at this point. As Erginel points out, those who make non-substantial individuals to be particular insist that they are not repeatable. Now, as we have seen, the senses

\[ \text{419 It is possible that Code could accept my emendations here as friendly to his view. Therefore, my objections here are objections to the definitions he provides in his paper, not an objection to his theory in general.} \]
receive the forms of non-substantial individuals as particular forms. And, as I have also noted, particular forms are non-repeatable. When senses receive a particular form, it would seem to be a repetition of the particular form. Erginel, Frede, and Owen have a way of explaining how these sensible forms can be repeated, since on their views non-substantial individuals are repeatable. But how can my view of non-substantial individuals account for the apparent repetition of a form in the sense organ?

My view accounts for it by supplying a restriction on the non-repeatability of particular forms. Particular forms are non-repeatable according to I-predication, but not H-predication. This is a reasonable restriction because Aristotle is committed to the notion that perception is the act of receiving forms without matter and to the notion that actual perception is of particulars. If particular are non-repeatable, then Aristotle must have some account of how we can receive particular forms in sensation while not violating the non-repeatability criterion. I can account for this possibility by using the distinction between I-predication and H-predication.

The logic of I-predication and H-predication outlined above also gives me a principled way of describing how other forms can be in the forms perceived by the special senses. As I have explained, the forms in the senses are particular forms. This means that the forms received by the senses are PA forms that are I-predicated only of the individual in which they subsist. Our Having of a PA form does not change what the PA form Is. Now the fundamental principle of transitivity says FP2: if (X Is Y and Y Is Z), then X Is Z. According to the logic I outlined above, the Is here can be any one of the three kinds of I-predication. This means that any property predicated of the particular individual in which the sensible property subsists is also in the sensible property. So, if (gold Is Amber and Amber Is furry), then (gold Is furry). The logic of I-predication and H-predication outlines how it is that the other forms are encoded within the sensible particulars.

Let me conclude this subsection by stating again that my intention here was not to enter into the debate about how to understand Cat. 2. Rather, I wanted to resolve a problem that resulted from my commitments to the following ideas: (1) that sensible forms are particular, (2) that particular forms are non-repeatable, and (3) Code’s Is-ing/Having distinction. I was able to preserve the fundamental principles of Code’s logic while presenting new definitions for I-predication and H-predication. These new definitions reflect the distinctions of being found in Met. X.1 and as a result are able to encompass more of Aristotle’s ontological vocabulary than Code’s original definitions were able to do. So, I consider my modifications of Code’s logic to be an improvement upon his original idea.

5.4.2: The perceiving of universals

I now want to turn to a contested passage from Aristotle’s Posterior Analytics, because the discussion of a question relating to how we perceive universals will afford me an opportunity to clarify how universals are in particulars. The passage in question comes from APo. II.19, and states:

(VIII) When one of the undifferentiated things makes a stand, there is a primitive universal in the mind (for though one perceives the particular, perception is of the universal—e.g. of man but not of Callias the man); again a stand is made in these, until what has

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420 Cf. DA II.12 424a17-19; DA II.5 417b18-27.
421 Cf. De Int. 7 17a38-17b1 for the non-repeatability of particulars.
no parts and is universal stands—e.g. *such and such* an animal stands, until animal does, and in this a stand is made in the same way. Thus it is clear that it is necessary for us to become familiar with the primitives by induction; for perception too instils the universal in this way.\[^{422}\]

In text (VIII) Aristotle affirms his commitment to the idea that one perceives particulars. The question that I want to consider is how “perception is of the universal”? I want to consider this question because the standard readings of this passage make perceptible forms to be universal forms, just not perceived as universal. Since I am committed to a reading of Aristotle that sees sensible forms as particular, I need to read the passage differently. This need, however, is not a problem for my view. Instead, my reading puts pressure on the assumption that all forms are universals and not particulars. If I can provide a different reading that incorporates my views about particular forms, that will put pressure on defenders of the standard reading and require them to argue for the idea that all forms are universals.

To see the problem more clearly, let us examine two examples of the standard approach to interpreting text (VIII)

When we perceive a particular (Callias) we retain a perceptual representation of it. The content encoded in this representation outstrips what the faculty of perception alone can grasp, since the content includes universal features (e.g., human being, two-footed) that the perceived particular instantiates. So the faculty of perception is receptive of universals, even though it cannot apprehend them as such. Perception is of the universal, not because the universal is perceivable, but because the universal is instantiated in particulars each of which is perceivable, and in virtue of this the universal is encoded in the representations we receive when we perceive particulars.\[^{423}\]

But then perceptual content must somehow involve universals as well, even in the cases where these are not grasped conceptually. In fact, on Aristotle’s view it must be possible to grasp these contents non-conceptually, since our most basic concepts first arise from earlier perceptual experiences, which are said to ‘implant’ the universal in us (*An. Post.* 2.19, 100b15), while other animals, though completely without concepts, are still capable of perceptual discrimination.\[^{424}\]

The general idea in these two readings is that sensation receives universal forms somehow, but the senses perceive the individual from which the universals come and they do not perceive the universals themselves. In a way, we perceive the individual *through* the universal, rather than perceiving the universal *qua* universal. It is the intellect that is able to perceive the universal itself. On the standard readings, the difference between sensation and intellection is one of perception not of reception. Marc Gasser-Wingate sums up this view in the following way:

[T]o say we perceive particulars is to say we perceive tokens (things that are not ‘predicated of many things’ and to say our perceptions are of universals is to say they

\[^{422}\] APo II.19 100a15-b5. Oxford translation.

\[^{423}\] Bronstein 2016, 245.

\[^{424}\] Caston 2015, 46-47.
are perceptions of types (things that are ‘predicated of many things’, De Int 17a38-40).\textsuperscript{425} Gasser-Wingate ends up rejecting the standard interpretation, at least in part. In light of our investigation into sensation in the last chapter and the fact that Aristotle does insist in many places that the forms of perception are particular, not universal, I have to reject the standard view along with Gasser-Wingate.

Gasser-Wingate responds by arguing, among other things, that the standard view does not account for the fact that sensation is basic and that sensation is basic precisely because it is particular and receives particulars. If sensation were to receive universals, then it would appear to be a defective kind of intellective activity, one that receives universals without perceiving them. Instead, he shows that what we receive in sensation is particular, not an unperceived universal. He writes, “Because its exercise is tied to present circumstances, perception cannot yield an understanding of the universal causal connections governing eternally-recurring phenomena—this is what makes it a particular capacity, and an appropriately basic starting-point for our cognitive development.”\textsuperscript{426} This view is related to mine, even if Gasser-Wingate does not use the terminology of arithmetic and formal unity that I use. On his view, what is received in perception is intrinsically related to a specific time and place, which is one way of establishing arithmetic unity. By insisting on the intrinsic temporal and locative character of sensations as well as the basic-ness of sensation, Gasser-Wingate wants to show that particular forms are not the same as universal forms.\textsuperscript{427} If what we sensed were universals that are perceived as particulars, then what we receive in sensation would not be basic and would not be time and place sensitive, but would be the same in kind as what the intellect receives.

But how is perception “of the universal” on Gasser-Wingate’s view? He argues that perception is “of the universal” because what is perceived is an effect of a universal. Gasser-Wingate explains that “a subject perceives some particular x (something as it appears to them here and now), but there is some universal y such that their behavior is responsive to features x has in virtue of being y.”\textsuperscript{428} On this view the perception of the particular form is basic, but our response to what we perceive is a result of the universals at work in the individual thing that we perceive. For the universal causes a thing to be the way it is and we respond to the way the thing exists. As a result, we are responding to the effects of a universal even if we do not receive a universal form into our senses.

Thomas Aquinas says something similar when he writes about animal instinct: “instinct is not aware of an individual thing as in a common nature, but only insofar as this individual thing is the term or principle of some action or passion. Thus a sheep knows this particular lamb, not as this lamb, but as something to be suckled; and it knows this grass just in so far as this grass is

\textsuperscript{425} Gasser-Wingate 2019, 456.
\textsuperscript{426} Gasser-Wingate 2019, 459.
\textsuperscript{427} Gasser-Wingate does not clearly articulate what he means by “basic,” but he uses it in a way similar to Johansen, who describes the basic-ness of a power of soul in the following way: “To cast the capacities in the role of the principles, in this model, is to present them as explanatorily basic in relation to other facts about the soul. It is also, for Aristotle, to suggest a certain view of the composition of the soul whereby the capacities play the role of elements with other features derived from them. This is because Aristotle thinks that those features that enter into the essence of something are the same features that are explanatorily basic in relation to its other attributes.” (Johansen 2013, 2)
\textsuperscript{428} Gasser-Wingate 2019, 463.
Aquinas is pointing out that brute animals cannot perceive the universal (indicated by "common nature" in the above translation). All they do is react to the particular forms they perceive in response to a particular need that must be fulfilled. Like with Gasser-Wingate’s view, the universal nature formally causes this particular lamb to have milk and so the baby sheep can seek out its mother for food as a final cause of its hunger. The universal formally causes this grass to be food for a sheep, and so the grass becomes a final cause that can satisfy the hunger of the sheep. This fact is related to how brute animals can develop learned responses to similar situations. For Aristotle such learned responses cannot be due to an ability on their part to grasp universals. Instead, repetition of similar stimuli builds within the animal a repeated response. The regularity of similar particular experiences is due to the causal effect of a universal form on the particular: “some things regularly appear to us some way because they belong to some universal, and this (together with our mnemonic capacities) explains how it might be possible for us to become reliably responsive to perceptions of a given type.” So, perception is “of the universal” in the sense that the animal response to the perceived particular is causally related to the action of the universal in the perceived particular.

All four of these views (Bronstein, Caston, Gasser-Wingate, and Aquinas) require that the universal be somehow encoded within the perceptible. The principal difference that divides the various views into two camps concerns what is received by the senses. The problem with the standard interpretations, represented here by Bronstein and Caston, is that it is unclear what the perceived representations are. If they are universals, then the only difference between perception and intellection is that perception observes the individual through the universals, while the intellect observes the universals as they are. For Gasser-Wingate this is a problem because it does not maintain the basic distinction between the powers of sensation and of intellection. I agree with him on this point because it would be difficult to understand the difference in kind between the activities of the sensitive powers from the activities of the intellect if both senses and intellect receive universal forms. Another possibility is that the standard view requires the senses to receive physiological representations of sensibles and that the universals supervene on those physiological representations. But that would require the change in sensation to be a literal change, which is a view I rejected in the previous chapter. Therefore, I agree with Gasser-Wingate that the standard reading of text (VIII) is problematic.

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429 Thomas Aquinas, In DA II, Lect. 13, n.398. The referent to “instinct” here is a reference to the power of perception and choice in animals. In the larger context of the passage, Aquinas is differentiating how humans perceive and how brute animals perceive, using the Avicennian distinction between estimative and cogitative powers. On this reading of Aristotle, when humans perceive particulars they do perceive the universal along with the particular because the intellect elevates the powers of sensation beyond what they are in brute animals. Brute animals are able to perceive object, but they must do so without the aid of intellect and so Aquinas is trying to explain how the differences in perception work. The way that Gasser-Wingate has set up his investigation, he is effectively treating the power of perception in humans and animals to be exactly the same, and so what Aquinas says about brute animal instinct applies to what Gasser-Wingate is aiming at.

430 One might think that this passage is orthogonal to our discussion, because Aquinas appears to be saying that animals do not perceive substances, only clusters of properties. That is not the case. By virtue of the estimative sense, Aquinas not only thinks that animals can be aware of individuals, he thinks that they can only be aware of individuals. To be aware of a cluster of properties requires a degree of abstraction proper to the intellect, not the sensitive powers. For sure, we can pick out which properties to which the animal is reacting, but it cannot. It just perceives an individual and has an instinctual response to the properties possessed by the individual.


432 In fact, I think this is probably what Caston has in mind in the above quotation.

433 Cf. section 4.4.
What I find helpful about Gasser-Wingate’s view is that the sensibles have the universals encoded in them by the formal cause that makes the perceived particular instantiate the universal form. I also appreciate how his view emphasizes the basicness of sensation, allowing the sensitive powers to be different in kind from the intellective powers. The problem with this view is that it is unclear why the *causal* character of the universals explains how those universals are encoded in the received sensations differently from how the standard view does so. Remember Gasser-Wingate’s description of perceiving that I quoted earlier: “a subject perceives some particular x (something as it appears to them here and now), but there is some universal y such that their behavior is responsive to features x has in virtue of being y.” The difference that causation is making here is that the universal elicits a response from the non-rational animal and is not perceived by the animal. Caston and Bronstein could reasonably retort that this is no different than perceiving some token x of the type y, which is how Gasser-Wingate describes the view he wants to reject. Therefore, I do not think that Gasser-Wingate has successfully argued against the standard interpretation of text (VIII).

What Gasser-Wingate needs is a more precise way of distinguishing what is received by the senses from what is received by the intellect. My view, presented in this chapter, gives us such a tool: the senses receive particular forms and the intellect receives universal forms. These different kinds of forms are different kinds of unities, but they are also unities that have necessary connections whereby the intellect can perceive the universal forms in the particular form. This intellectual perception does not require that the senses receive the universal forms as such, but that the intellect can come to perceive the universal forms through observation of multiple particular forms and make inferences therefrom. That is why the logical framework I outlined for I-predication in the previous subsection is so important. There I claimed that FP2, the principle of transitivity, works no matter which of the three IP* predications one uses. In what I said above, it seems fairly clear how other PA forms are in the particular form received by the senses through transitivity. It is also clear that through FP2, the intellect can have access to the universal forms UA and US through the perceptible forms. How that access happens is unclear at the moment, but I will sketch that process in the next section. For our purposes here, it is important to note that my distinction between particular and universal forms preserves the basicness of perception by preserving the difference in kind between the activities of the intellect and of the sensitive powers. It also gives us a logical framework by which we can understand how the intellect can have access to the universal forms via the particular forms. It is the access that the intellect has to the universal forms through the particular forms that allows us to see how perception can be “of the universals,” as Aristotle says in text (VIII).

Having considered two questions related to our investigation into sensation and particular forms, we are now in a better position to understand particular forms and how universal forms are different in kind from particular forms, thus necessitating that the activity of intellect be different in kind from the activity of sensation. Before moving on to that investigation, let me briefly summarize what we have learned so far about particular forms. The forms of sensation are particular insofar as they are forms of an individual. The received forms have a natural relation to other properties in that individual because they are arithmetically identical with those forms. This identity of particular forms means that the other forms of that individual are present in the sensible form, for they are I-predicable of the particular forms received in the senses by virtue of the principle of transitivity. The universal forms, though not perceived by the senses,

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434 Gasser-Wingate 2019, 463.
are nevertheless present in the particular forms as causing those particular forms to exist in the individual.

5.5: Universals and how we get them

The reason why I have spent much of this chapter discussing the forms of sensation rather than the forms of intellection is that the notion of a universal form in Aristotle is familiar, while the notion of a particular form is not. As Gasser-Wingate referenced above, Aristotle in De interpretatione says that a universal is “that which is by its nature predicated of a number of things, and particular that which is not; man for instance, is a universal, Callias a particular.” Aristotle says something similar in Met. III.4: “For this is just what we mean by individual—the numerically one, and by the universal we mean that which is in individuals (to epi toutôn).” It is also uncontroversial that the objects of the intellect are these universal forms: “One thinks (noei) what is undivided not in quantity but in form (eidei) in an undivided time and with an undivided part of the soul.” We saw a similar point made in text (IV) above. So, the contrariety between form and privation that defines the changes of the intellect is between having and not-having a universal form. All of that being taken for granted, there are still some ambiguities related to how the mechanism of change in intellection works. I think that by examining how the most basic part of intellective activity works we will better understand the objects of the intellect and therefore be better able to discern the difference in kind between the activity of the intellect as opposed to the activity of the sensitive soul. That will be our final task in this chapter and this dissertation.

To see the difference in kind between sensation and intellection, all I have to do is to show that the most basic function of intellect is different in kind from the most basic function of the animal soul, namely sensation. Why? Because just as imagination and memory are dependent upon the activity of sensation, so the different acts of the intellect, e.g. episteme, technē and phronēsis, are dependent upon the activity of noein. Therefore, the activity I am going to focus on is the activity of noein (intellection), which, like sensation, cannot be in error. Aristotle makes this latter claim explicitly at the end of DA III.6:

(IX) It is also the case that every assertion, just as every denial, says one thing of another, and is true or false. But not every instance of reason (nous) does; rather reason directed to what something is with regard to its essence (kata to ti ūn einai) is true, and does not say one thing of another. Rather, just as the seeing of an exclusive object is true, while whether the white thing is a man or not is not always true, so things are with respect to whatever is without matter.

In text (IX), the activity of noein is compared to the activity of the particular senses, which cannot be false. This means that when the mind picks out a universal form, it cannot be wrong about what the form is, even if it may be wrong in predicating that the form exists or that a form belongs to a particular subject. So if we can see why noein differs in kind from sensation, then we will see how the activities of intellect also differ in kind.

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435 De Int.7 17a39-b1.
436 Met. III.4 999b33-1000a1. I have modified the translation slightly.
Let us begin by considering the universality of the forms. When we were discussing how forms are one in number, we noted that arithmetic unity brings together disparate forms, such as white and musical, in the same subject. As a result of this unity in the same subject, each of these forms can also be predicated of one another. Despite the fact that whiteness has no essential relation to musicality, we can predicate Socrates’ musicality of Socrates’ whiteness because both are predicated of the same individual, Socrates. Formal unity, on the other hand, is a unity based on essence (to ti ēn einaì), as text (IX) indicates. Whereas in arithmetic unity diverse forms are related to one another in a single individual, an essence can relate diverse individuals not arithmetically united to one another by means of sameness in essence. For example, take two individuals, Socrates and Callias. Clearly, they do not have arithmetic unity with one another, but they do have the same form in that both are individuals of the species human, and “human” in both particulars is essentially and definitionally the same. Essences can also relate diverse universal forms to one another. For example, we can say that the universals “human” and “dog” have a formal unity in the sense that they are both species of the genus “animal.” Formal unity comes about because there is some more generic universal essential form that can be predicated of diverse individuals or diverse specific forms. These are what we call essential relations. Universals are joined one to another by virtue of their essential properties, but differentiated by so-called specific differences. This essential unity of a form is clearly a different type of unicity from arithmetic unity which brings together forms that have no essential relation to one another in an individual.

What I have just outlined is a fairly straightforward account of Aristotle’s view of universals and should be uncontroversial. It should also be uncontroversial that these universals are causal, in the sense of their being formal causes. Certainly Gasser-Wingate takes it as obvious, and considering that Aristotle identifies formal causality as one of the four causes, this too should be uncontroversial. The reason why I am revisiting this material is to clarify what we are looking for in a universal: an essential property that is predicable of more than one individual. I should note that I am taking for granted here the idea that universal accidents are essential properties of particular accidents. So, universals of substances and accidents are both essential properties of some particular form.

How do we identify these universal properties? Something like the following passage from Met. I.1 must be true about how the intellect abstracts essential properties from particulars. Aristotle writes:

\[(X)\] From memory experience is produced in men; for many memories of the same thing produce finally the capacity for a single experience. Experience seems to be very similar to science and art, but really science and art come to men through experience; for 'experience made art', as Polus says, 'but inexperience luck'. And art arises when from many notions gained by experience one universal judgment about similar objects is produced.\[441\]

\[439\] I have opted for “similarity” rather than “unity” because the form is united as one object, whereas the individuals are “similar” by sharing in the same form.

\[440\] Potentially if not actually. Presumably there can be a distinction between species and individual even if there is only one member of the species.

\[441\] Met. I.1 980b28-981a7.
The “experiences” in this passage are some combination of sensible forms of particular individuals in imagination or memory. Whether these experiences are phantasms or something else need not detain us.\textsuperscript{442} The importance is that experiences are about things that are particular and numerically one. What the intellect does is to discover universals by comparing many particulars. How does it do this? Remember that, as particulars, the sameness of the forms is due to sameness in terms of individuals. So, Amber’s gold and Amber’s fur are related to one another because they are properties of Amber. When the intellect compares individuals, say Amber and St. Mark’s Cathedral, what it does is show a unity between things that \textit{are not} the same individual. If I were to bring Amber into St. Mark’s nave, my senses would identify two different particular golds, while my intellect would identify that there is a similarity between these two golds. That similarity is the result of the same formal object, the universal property “gold.” Their similarity, then, is a result of the sameness in universal form, in this case, the sameness with respect to their golden hues.

This is important to highlight. Sensation does not recognize unity of universal form, but only recognizes arithmetic unity such that we can tell that Amber’s fur and Amber’s gold belong to the same individual.\textsuperscript{443} This is a basic function of the sense powers. However, the senses cannot identify a unity or sameness between things differing in number. Certainly the sense faculties can discern that Amber and St. Mark’s are not the same individuals. The senses can also separately identify the golden hue of Amber’s fur and the golden hue of St. Mark’s tesserae. But the senses cannot identify “gold” as the same form in both. That is the function of the intellect, which can perform this act of recognition in a properly basic way, just as the senses can pick out arithmetic similarity in a properly basic way. These are two different kinds of distinguishing.

That Aristotle recognizes two distinct kinds of distinguishing power is obvious from something that he says in \textit{DA} III.4 429b10-24. The general context of this passage in \textit{DA} III.4 is a discussion about the nature of intellect. The first thing to notice about this passage is the stated ambiguity of what precisely is doing all the distinguishing of objects. The entire passage does not offer us a subject of \textit{krinō}, but simply uses the 3\textsuperscript{rd} person singular “\textit{krinei}” throughout. Clearly

\textsuperscript{442} There is a significant amount of literature on the topic of \textit{ἐμπειρία} in this passage and in \textit{APo.} II.19. Cf Le Blond 1939; Lesher 1973; McKirihan 1992; Barnes 1993; Scott 1995; Charles 2003; Travis 2003; LaBarge 2006; Gregoric and Grgic 2006; Gregoric 2008; Tuominen 2010; Bronstein 2012; Hasper and Yurdin 2014; McCready-Flora 2014; Gasser-Wingate 2016; Gasser-Wingate 2021. The question related to my discussion here concerns whether \textit{ἐμπειρία} universals or particulars. The reader will note that I am not impartial in this debate and that I consider \textit{ἐμπειρία} to be particulars, and not the first stage of universals. If my argument turned on that commitment, I would argue for my position. However, if it turns out that I am wrong and that \textit{ἐμπειρία} are the first universals that comes to rest in the soul, then all I have to do to preserve my argument here is to move the discussion back to memories and phantasms. If the reader thinks that \textit{ἐμπειρία} are universals, then I invite you to interpret what follows in that manner and make the necessary changes.

\textsuperscript{443} One might wonder whether this means that brute animals cannot pick out different shades of gold since they cannot identify universals. Brute animals can differentiate between shades because they can recognize differences on the level of particularity, so Amber’s shade of gold will be recognized as different from Bamber’s shade of gold. What brute animals cannot do is identify that the golds of Amber and Bamber are the \textit{same} color at one level, i.e. that while they are different shades, they are nevertheless both gold. What is more, brute animals can recognize relevant similarities and react to them, but they cannot perceive the similarities as universals. This is where Gasser-Wingate’s discussion of perception being \textit{of the universals} insofar as those universals are causes is important. Whether or not the animal recognizes that there is a universal form that makes certain properties of the same kind (say the green in grass), they are nevertheless caused by that universal to react in a certain way to that property. My view entails that the brute animal can be caused to react that way because the universal causes the particular form to be in a certain way, and so causes a particular reaction from brute animals when they perceive that particular form.
the subject of *krinō* is some faculty of the mind, be it sensation or an activity of the intellect, but it seems to me that the ambiguity is intentional on Aristotle’s part. He implies that there are two faculties by which we distinguish two kinds of things: “On the one hand, [the mind] distinguishes (*krinei*) hot and cold by sensation, and of these the flesh is a kind of *logos*. But on the other hand, [the mind] distinguishes (*krinei*) the being of flesh either as something separate or as in the case of what has been bent is in relation to itself when it is straightened.” The first faculty distinguishes individuals by virtue of their particular properties. The second faculty discerns similarity between objects, by picking out the essence (*to ti ēn einai*) that unites them. These two different faculties are clearly different in kind, and so we can use the difference in kinds to show that the activities of intellect are distinct in kind from the activities of sensation.

5.6: Conclusion

The purpose of this last chapter was to distinguish between the kind of change that occurs in sensation from that of intellection. Unlike in earlier chapters there was no need to discover what the contraries are, for they are well known to be the transition marked by the reception of a universal form. However, we needed to distinguish the matter-less forms of the intellect from the matter-less forms of sensation. The reason we needed to do this was because my discussion of sensation in the previous chapter insisted that there is no material change in the essential aspects of sensation and the end result is a form abstracted from matter. This description made sensitive forms look an awful lot like universals. Also, as we saw in section 5.4.1, often scholars consider sensitive forms to be universals, just universals that are perceived as individuals. So, my task in this chapter could only be accomplished by clearly identifying what is unique about the matter-less forms of sensation that differentiates them from universals.

What we discovered is that understanding the *particularity* of sensitive forms is key to seeing how they are different from universal forms. The forms of sensation are particular insofar as they are arithmetically one with the individuals from which they come. As particular forms, sensitive forms have a natural relation to other particular properties in that individual because they are arithmetically identical with those forms. This arithmetic identity of particular forms in individuals means that when those forms are abstracted from matter, the other forms of that individual are still present *in* the sensible form. As forms of an arithmetically one object, the abstracted forms are I-predicable of the other particular forms that belong to the individual from which they came. The universal forms are also *in* the particular forms. The universal forms are in the particular forms insofar as those universal forms cause the particular forms to exist in a certain way. This last point is crucial, because if the intellect is going to see the universals in the particular forms received by the senses, those forms must be encoded in the particular form in some way.

Once it was clear what a particular form is for Aristotle, it became easier to understand what makes a form universal. It is commonly understood that universal forms are predicable of many individuals and that they are causes of those individuals. What is not so well understood is how the intellect abstracts the universals from the particular forms. This became a special problem for me since I reject the consensus view that makes sensible forms into universals of some sort. What makes a universal form different is that it only includes essential features. This means that it encodes genus/species relations and exclude accidental relations. The way the intellect becomes aware of these forms is through comparing experiences. The intellect observes

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444 DA III.4 429b14-18.
two arithmetically different individuals and is able to discern a similarity between them. When this similarity is identified as a form that form is abstracted from the particular forms because it is separated from the non-essential forms that are associated with it in each individual. Thus the intellect is able to perceive the universal in the particular, and receive the universal form from the particular form. The distinction between universal and particular forms is clearly a distinction in kind, and so it becomes clear why it is that the activity of the intellect is different in kind from that of the sensitive powers.

With that discovery, I consider my task here complete. There are many more questions related to intellect that touch upon what I have discussed, but they will have to be addressed at another time. For now it is sufficient that I have shown why it is that the contrariety of intellect is different in kind from the contrariety of sensation.
Conclusion

“Anyone who is going to examine in detail what is said about the soul and reach agreement on characterizations of its essence must first appreciate the extraordinary magnificence of nature, before all else. For once we have learned just what sort of thing nature is and have been persuaded that its workings are more incredible than any marvel produced by art, we will more easily be convinced by what is going to be said about the soul.” (Alexander of Aphrodisias, *On the Soul* 2.10-15)
6: Conclusion of the dissertation

We began this dissertation aiming to understand why Aristotle divides up the *scala naturae* in the way that he does. As I noted in the introduction, previous accounts that purported to explain this division were unsatisfactory. Explanations based on the influence of Plato fall flat, because they do not explain why Aristotle divides up soul into different kinds. The separability account of Corcilius and Gregoric also failed in that it could not adequately explain the place of the sensitive soul. Explanations that make the powers of soul basic, like that proposed by Johansen, do not adequately explain the unity of the soul and the interdependence of the various parts of soul upon one another. In other words, too much is taken as basic on Johansen’s account and if another, more elegant theory, provides a more comprehensive explanation, that theory should be preferred. I have argued for such a theory in this dissertation.

I began in chapter 1 by identifying what the fundamental principles of natural change must be. We looked at an argument that Aristotle gives for these principles in *Phys.* I.5, where he concludes that all change must ultimately be between contraries or some intermediate between contraries. We were also reminded that the primary contrariety in change is constituted by a form and its privation, and that all intermediates are reducible to that primary contrariety. This discovery proved fruitful, as it provided the framework for our investigation into the kinds of change that occur at each level of the *scala naturae*. If the powers exhibited at a different level of the *scala* are between contraries different in kind from the contraries of the previous level, then we are able to identify a clear explanation for why the various powers of soul can constitute different levels of being.

In chapter 2, I investigated the contrariety that determines all non-living changes. These primary contraries are already well known to scholars of Aristotle: hot and cold, wet and dry. However, my investigation dug deeper into the definitions of these basic contraries in order to understand why the primary contraries had to be tangible and why cold and wet are privation contraries while hot and dry are form contraries. This investigation then helped us to understand the basic mechanisms of change among non-living bodies.

In chapter 3, I investigated the first distinction in kind on the *scala naturae*: that between living and non-living bodies. In that chapter I did an in depth examination of how the mechanisms of change found in the simple bodies is also at work in complicated mixtures. This examination required that we understand the theory of intermediates better by understanding the notion of *being potentially* and how mixtures are “reducible” to the simple bodies. With a clearer understanding of the mechanisms of change in mixtures, we were ready to see how the faculties of soul caused change in a different way. The changes that mixtures enter into are determined by the potencies of the elemental profiles of their forms. But the changes that nutrition causes are not determined by the potencies of the elemental profile, for diverse elemental profiles are potentially ensouled. In fact, the ensouled body receives the potencies of the bodies it digests without a corruption of its own form. What is more, when non-living bodies engage in change, they corrupt from a homogeneous body into a homogeneous body. But because many different elemental profiles are in potency to receive a soul, the ensouled body can be composed of heterogeneous bodies. In a way the vegetative soul can be said to take in the matter of non-living bodies without the form of those bodies.

In chapter 4, we looked at the difference between the faculties of the vegetative soul and the sensitive soul. Where the vegetative powers can receive matter without form, the sensitive powers can receive the form of objects without the matter. That the senses receive the forms of
sensible objects without their matter is stated explicitly by Aristotle in DA II.12. Understanding what this turn of phrase means was the primary goal of that investigation. We discovered that in sensation the continuity between the medium and the sense organ allows for the medium to share with the organ the forms it receives from the objects of sense. In this way, the sense organ can receive a form without undergoing a literal change.

In chapter 5 we examined the difficult topic of the intellect. There we had to understand the difference between the matter-less forms of sensation and intellection. We discovered that the sensitive forms are particular. This particularity indicates an arithmetic unity that the forms of sensation have with the object that is sensed, and as a result of that unity the sensitive form contains within it the other forms of the individual, both particular and universal. I then used the understanding of particularity to distinguish sensitive forms from intellective forms, which are universal. What makes a form a “universal” is that it is related to other forms by means of essential properties, and excludes the accidental property relations found in particular forms. The intellect observes these universal forms by identifying a kind of unity that is not a unity in an individual. It is by recognition of a unity in form between particular individuals that are experienced that allows the intellect to identify and abstract a universal form. And with that distinction and mechanism properly identified, I concluded my project.

With each of these chapters, I have used the discovery of contrarieties of change as a way of differentiating different steps in the scala naturae. However, this dissertation did more than just clarify the categories of change that specify each step of the scala naturae. It also used the lessons we learned along the way to offer new solutions to thorny problems in the scholarship. My investigation of the Phys. I.5 argument in chapter 1 tried to resolve questions about the nature of that argument that have plagued scholars in recent years. In chapter 2, I used my analysis of the primary contraries to resolve problems inherent in previous interpretations of the cycle of changes described in GC II. In chapter 3, my explanation of the mechanisms of change and potential existence gave me a way to consistently explain the changes of mixed bodies in Aristotle’s studies of nature in Meteorology and PA. In chapter 4, I was able to provide a new approach for understanding sensation as a spiritual change. In chapter 5, I was able to approach a clearer understanding of what it means for a form to be particular and for a form to be universal. These extensions of my principal narrative about natural change and the distinction in kind between the powers of soul found at each level of the scala naturae shows that focusing on the contrarieties involved in change is a powerful tool of analysis.

Although I have been able to do much with this project, many questions remain. I hope that this project will be seen as a beginning, not an end. The tools that I have developed here will be useful to scholars in analyzing Aristotle’s arguments in his investigations into natural science. But even if others do not take up my tools of analysis, I hope that this project has, at the very least, reminded us of how the works of Aristotle are a truly remarkable achievement. For if one theoretical tool can help to make sense of such diverse theoretical arguments, then we are shown once again how comprehensive and consistent is his pursuit of philosophy.
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