ARISTOTLE ON ANIMAL SELF-MOTION

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Aristotle on Animal Self-Motion

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Take a pen or pencil or some other small nearby object and slide it across your desk. The object moved from one place to another because you moved it. It wasn't moved by itself. But what is the cause of your moving from where you were to where you currently are? You appear to move yourself. This dissertation focuses on what Aristotle has to say about self-motion, especially how and why non-human animals are capable of moving themselves (αὐτὰ ἑαυτὰ κινοῦσιν), that is, flying, swimming, running, crawling or slithering from one place to another. I bring out (a) new ways or new interpretations of ways in which, for Aristotle, animal self-motion is independent, autonomous or self-directed (αὐτοκίνητος), (b) new senses or new interpretations of senses in which Aristotle thinks that animal self-motion is dependent, that is, not under the control of the animal, and (c) new ways to understand the compatibilism between the independence and dependence of animal self-motion. I argue that there are compelling, interesting, and unexplored (or at least underexplored) reasons to think that, for Aristotle, the independence of animal self-motion is compatible with many important senses in which whether and how an animal moves is not up to the animal. These excavations shed light not just on Aristotle, ancient philosophy, and the history of science but also on agency, autonomy, and responsibility. In particular, they shed light on ordinary and yet often ignored senses in which we seem to hold that we

perform actions as autonomous agents, and we can be held responsible for those actions, despite there being many important senses in which what we do is not up to us.

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CHAPTER 1

INTRODUCTION

Some things such as the Pythagorean theorem and the principle of non-contradiction cannot change. Other sorts of things can and do change. Sometimes they move. Often it is clear that they are caused to move. A torn-up rag moves steadily downhill in a creek because of the movement of the water in the creek. The water in the creek flows downhill because water, as a heavy element, always moves downward unless impeded toward the center of the earth, which also happens to be the center of the universe (for Aristotle), or because of gravity (for us). Trees, flanking the creek, wave their branches because of the force of the wind. But why do floating ducks resist the movement of the water, unlike the rag? Why do flying ducks resist the movement of the air, unlike the branches? Why do the ducks sometimes move onto a rock and quack their annoyance? Why do they suddenly fly out of the area, using their wings to take them to one specific spot rather than the spot suggested by the wind? How do they float and fly in seemingly self-directed ways? Are their movements just as firmly set in the causal structure of the world as the movements of the rag, the water, and the branches, despite the self-directed nature of the ducks' movements?

Aristotle worries that if an animal, such as a duck, is moved by nothing other than itself, then this might well be taken as proof that motion can spring up out of nothing except the mobile object itself. But if that is so, then, Aristotle worries, all motion in the universe might have sprung up in an unequivocally self-caused way. He observes that, unlike lifeless (ἄψυχος) things, living (ἔμψυχος) things such as human and non-human animals (including ducks) seem to be able to start moving themselves by themselves without a cause of their motion outside (ἔξωθεν) them (*Physics* viii 2.252b17-20). Animals walk, run, jump, swim, slither, soar, and climb without being pushed or pulled or more generally moved by anything

else. At a time t_0 we are quite still, without any motion in us, and then at a later time t_1 we produce a beginning of motion in ourselves spontaneously (viii 2.252b17-21). Aristotle extrapolates: if motion can start in an animal by the animal alone, without external impetus, "then why could this not also occur in the universe [τί κωλύει τὸ αὐτὸ συμβῆναι καὶ κατὰ τὸ πᾶν]"? (viii 2.252b25-26). Perhaps the entire cosmos might be still at t_0, without any motion in it, and then at t_1 there is a spontaneous beginning of motion in the cosmos. But that period of time with no motion at t_0 would, among other things, contradict Aristotle's thesis that there necessarily always was and always will be motion. So animal self-motion might be thought to present a difficulty (ἀπορία), and indeed, Aristotle says, the greatest difficulty for his view that motion necessarily always was and necessarily always will be (viii 2.253a8).

This dissertation focuses on what Aristotle has to say about self-motion, especially how and why non-human animals are capable of moving themselves (αὐτὰ ἑαυτὰ κινοῦσιν) from one place to another, that is, voluntary self-locomotion such as flying, swimming, running, walking, crawling, and slithering. I bring out (a) new ways or new interpretations of ways in which, for Aristotle, animal self-motion is independent, autonomous or self-directed (αὐτοκίνητος), (b) new senses or new interpretations of senses in which Aristotle thinks that animal self-motion is dependent, that is, not under the control of the animal, and (c) new ways to understand the compatibilism between the independence and dependence of animal self-motion.

I argue that, for Aristotle, when a duck moves from one part of the creek to another, resisting the force and direction of the water, the duck's motion is qualified in at least one basic way, namely, the motion of the whole duck is dependent on its (proper) parts such as its soul; the duck's motion is a more self-directed change than the growth and metabolism of

the trees flanking the creek; the water in the creek, despite appearing to be moving by itself, is not in fact capable of moving itself; the duck moves as a result of its soul-faculty of *phantasia* (something like imagination) using the activity of the duck's senses to form an internal image, and the duck's soul-faculty of desire targets that image as an object of pain (and to be avoided) or one of pleasure (to be pursued); the duck's faculty of desire is the primary mover in the duck's soul, but it operates together with practical *nous* (thought, mind) and *phantasia*; the duck has the requisite faculties of the soul in a determinate way unlike animals such as sea urchins and anemone, and the duck is dependent on the proper functioning of its distance senses (sight, smell, and hearing) and its correspondingly determinate faculties in order to float and fly in clearly self-directed ways; the duck's motion is dependent on water (when it floats) or air (when it flies) as external resting points where the downward force exerted by the duck's heaviness and wings and/or webbed feet cannot be greater than the resistant force exerted by the water or air; and, finally, the duck's self-motion is dependent on, and/or at least sometimes significantly affected by, involuntary and non-voluntary motions such as respiration and digestion. In general, then, animal self-motion is uniquely self-directed, independent, and autonomous – that's why it's correct to call it 'self-motion' rather than just 'motion'. But it is also dependent on many factors outside the animal's control. This is why Aristotle's account of self-motion is certainly not a threat to his view that motion necessarily always was and always will be. So, I argue that there are compelling and interesting reasons to think that, for Aristotle, the independence of animal self-motion is compatible with many important senses in which whether and how an animal moves is not up to the animal.

I am not the first philosopher to argue that, for Aristotle, an animal can be moved by itself (ὑφ' ἑαυτοῦ) while also being moved by something else (ὑπ' ἄλλου) and by other

things (including things inside the animal, such as its respiration) that are not under the animal's control. But I am the first to excavate this compatibilism with respect to, for instance, Aristotle's account of the independence of growth and metabolism in plants in comparison with the independence of self-locomotion in animals (Chapter 3), Aristotle's strange and often-dismissed argument in *Physics* vii 1 that seems to conclude that self-motion is altogether impossible (Chapter 2), his puzzling remarks in *De anima* iii 11 to the effect that some animals such as sea urchins are indeterminately capable of moving themselves and have the requisite faculties in an indeterminate (ἀορίστως) way (Chapter 5), his account of the ways in which earth, water, and air function as different kinds of external resting points for animal self-motion (Chapter 6), and the differences between Plato's account and Aristotle's account of involuntary motions required for self-motion (Chapter 7). Also, I offer a new way to understand Aristotle's account of the structure of the soul of a self-moving animal (Chapter 4), and I shed new light on Aristotle's distinctions between natural elemental motion and animal self-motion, given in his *Physics* viii 4 (Chapter 2).

These explorations shed light not just on Aristotle, ancient philosophy, and the history of science but also on agency, autonomy, and responsibility. In particular, they shed light on common and yet often ignored senses in which we seem to hold a kind of compatibilism between the autonomy and independence of agency, on the one hand, and the dependence and non-autonomy of agency on the other. For example, I assume that you believe that you are reading this paragraph. You believe that your reading this paragraph is a (questionable) choice of yours, an action for which you can legitimately be held responsible. As you read this sentence, your eyes are moving, focusing on one word after another. The focus of your vision moves from the left to the right side of the page, repeatedly. While this movement is occurring, another movement is occurring: your eyelids rapidly close and open.

That is, you are blinking. In addition, you are breathing. Your breathing requires movements of many different kinds. Air moves into and out of your lungs. As you inhale while at rest, your diaphragm contracts, as do your intercostal muscles, moving your rib cage upwards and outwards. As you exhale, those muscles relax. Your chest and abdomen move back to the resting position. Then there are, of course, the intricacies of the movements we refer to as 'digestion'. And I have not even begun to discuss the motions occurring in your brain and central nervous system and other parts of your body and psyche. You were probably not at all aware of any of these motions until I drew your attention to them, and you would probably agree that none, or at least hardly any of, these and other motions were or are under your control. Yet your reading is dependent on, and/or shaped by, these and other related factors, processes, and motions.

Then there are the fortuitous absences of external motions that allow you to continue reading. You are able to continue reading this in part because you have not been interrupted by a pushy salesman knocking on your front door, because your child (or partner or friend or whatever the case may be) has not knocked over your computer or called you on Skype, because the floor or ground beneath you has not given way, and because you have not suddenly felt an overwhelmingly strong desire (latching onto an internal image suddenly popping into your head) for a piece of chocolate cake. Despite the fact that these and many other motions, and the absence of these and many other motions, lie often outside our awareness and control, you nonetheless hold with good reason that you are reading this paragraph and you can be held responsible (praiseworthy, for instance) for this action of yours. Many of the independency-dependency areas of compatibilism in Aristotle's account, to which I draw our attention in my dissertation, bring out these and other unexplored ways in which our ordinary notions of autonomy, agency, and responsibility seem to tolerate a

good deal of compatibilism between dependence and independence. We gain a clearer understanding, that is, of why an agent can be said to perform an action in a genuinely autonomous way, such that the agent can legitimately be held (perhaps morally) responsible for the action, despite the agent's having little if any control over many factors, motions, and absences that are in some cases not mere necessary conditions for the agent's performing the action but also affect how the agent performs it. These subtle factors, especially as a collective whole, often shape the possibilities for what we do and how we do what we do.

Yet we still, most of us, believe that we do what we do because we want to do it. We believe that we read what we read, and we read how we read, because of our decisions. And we believe, usually, that we ought to be held (morally) responsible for what we do. By emphasizing these features of Aristotle's account of animal self-motion, I suggest that we can reveal interesting and largely novel senses in which our ordinary notions of agency, autonomy, and responsibility are deeply compatibilist: an agent, S, can autonomously perform an action, A, where S is responsible for A, despite there being many senses in which, perhaps unbeknownst to S, whether S does A and how S does A are not (much) up to S. Moreover, despite the fact that there can be, and often are, many ways in which whether S does A and how S does A are not up to S, we still hold S responsible for A.

Why do we take this autonomy to be present? Here too, we find some insights through some of the features of Aristotle's account that my dissertation emphasizes. For example, my reading of Aristotle's account of the structure of a self-moving animal's soul, on which the faculty of desire is the primary mover and where desire always functions together with *phantasia* and practical *nous*, helps to show what exactly we mean when we say that 'S did A because S wanted to do A' or 'doing A was up to S'. One way of putting this: we mean that S did A because S had an internal image or understanding of A, S took A to

lead to the attainment of an object of desire for S, and S used some practical deliberation about how to do A and how to attain that object of desire. This description may help to shed light on why we ascribe responsibility to S for S's doing A: of course, it is not merely because S did A. Nor is it merely because S did A where S could have done something other than A. Nor, indeed, is it merely because S did A and S wanted to do A. Even the latter description is far too weak. For it is easy to imagine cases where S does A, S wanted to do A, but S did not do A because S wanted to do A. For instance, an angry truck driver might run someone over due to a split-second distraction while she was driving, and it might turn out that she feels no remorse for the pedestrian's death because the truck driver did want to run someone over. But it's false that the driver killed a pedestrian because the driver wanted to do so. For that reason, we would certainly blame the driver for her lack of remorse but we would probably not blame her for her running over the pedestrian – the latter was caused by a distraction, whereas her character causes her lack of remorse. Aristotle's account, on my reading, sheds light on the importance of the causal connection between, on the one hand, the role of the agent's faculty of desire, basic understanding, and practical deliberation in S's performing A, and on the other hand, S's responsibility for A. That is, Aristotle's account of the psychological or soul-centered structure of the causes of animal self-motion nicely bring out the importance of S's doing A because S wanted to do A, as a more robust and illuminating condition for (moral) responsibility than the mere ability to do otherwise.

A brief note on scope: though this dissertation has a lot to say about its topic, there is a great deal it leaves unsaid. I do not, for example, have a detailed study of Aristotle's abstract discussion of self-motion in his *Physics* viii 5, where he aims to show that a self-mover could not have been the very first mover. I point the reader to excellent studies of that discussion in for instance, Coope (2015) and Morison (2004). Besides the fact that viii 5

has already received plenty of discussion in the literature, another reason I could not find space in this dissertation for a detailed study of viii 5 is that I felt that responsibly addressing such a rich (and long) stretch of text would have threatened to turn this dissertation into a study of *Physics* viii and/or viii's connections with Aristotle's discussions of the primary and unmoved mover in his *Metaphysics* Λ. For similar reasons, I do not have space for a detailed study of the problem of whether or not the celestial spheres are, for Aristotle, self-moving; on that subject I recommend the lively debate that occurs between Judson (1994) and Kosman (1994). Finally, I do not have any chapters on mental or *noetic* self-motion. We are animals, for Aristotle (and for today's scientists). In particular, we are reasoning animals capable of acquiring virtues and vices. Though Aristotle notes and is deeply impressed by the fact that many animals have memory, personality, the ability to create marvelous webs and ingenious designs for nests, and the capacity to learn commands and instructions, only human beings can recall the past at will, for Aristotle. Human beings, unlike all other animals, in Aristotle's view, are capable of thinking just because we want to think. How should we understand this capacity? Wedin (1994) and Shields (1994) try to answer that question. While I would love to explore this fascinating problem in other work, the task of responsibly addressing Aristotle's account of physical, rather than also mental, self-motion in (human and non-human) animals has proved more than complex enough to occupy a single dissertation. Moreover, given Aristotle's remarkable and pioneering enthusiasm for biology and natural science, my selection of focus does not seem out of place.

CHAPTER 2

ARISTOTLE AGAINST (UNQUALIFIED) SELF-MOTION: *PHYSICS* VII 1.α241b35-242a49 / β241b25-242a15[1]

Abstract: It is well known that Aristotle tries to make room for self-motion – an idea he inherits to some extent from Plato – within his other commitments, such as the principle that every effect has a causal antecedent, while at the same time modifying the concept of a self-mover. However, one argument in *Physics* vii 1 seems to pose a problem for the bare possibility of self-motion; in it he seems to argue that everything that moves must be moved by something else. The text in which this argument appears is itself vexed on a number of fronts, because it is not clear how *Physics* vii fits with the rest of the *Physics*, and also because there are two distinct manuscript traditions for *Physics* vii. So the argument in *Physics* vii 1 has not been adequately taken into account in discussions of self-motion. I argue for a new and charitable reading of Aristotle's *Physics* vii 1.α241b35-242a49 / β241b25-242a15. I show that the argument is compatible with Aristotle's endorsements of self-motion; I defend the argument's most controversial premise; and I argue that my reading has some useful implications for understanding Aristotelian self-motion.

I. INTRODUCTION

It is well known that Aristotle tries to make room for self-motion – an idea he inherits to some extent from Plato – within his other commitments, such as the principle that every effect has a causal antecedent, while at the same time modifying the concept of a self-mover. However, one argument in *Physics* vii 1 seems to pose a problem for the bare possibility of self-motion; in it he seems to argue that everything that moves must be moved

[1] This piece is forthcoming in *Ancient Philosophy*.

[2] Bostock 1996, lxix-lxx writes: "I believe that, if Aristotle had himself prepared his *Physics* for publication, he would have omitted VII altogether. …Aristotle intended the whole of Book vii to be

by something else. If this were true, then it would seem to pose a problem for the possibility of something self-moving at all. For what is self-motion but moving without being moved by anything else? The text in which this argument appears is itself vexed on a number of fronts, because it is not clear how *Physics* vii fits with the rest of the *Physics*, and also because there are two distinct manuscript traditions for *Physics* vii. For this reason, the argument in *Physics* vii 1 has not been adequately taken into account in discussions of self-motion.[2]

A preliminary note about the text: there are two extant versions of the *Physics* vii 1-3 (though not for the remainder of *Phys.* vii, i.e., chapters 4-5). This creates special interpretive difficulties for us, which I will briefly describe here. The two versions are referred to as α and β. These versions were known to Simplicius in late antiquity and left their traces in the MSS tradition of the *Physics*: some MSS have one version, others the other, and yet others have combined or contaminated versions. In Ross's OCT, the two versions are kept apart and have been printed separately. The Greek I use here is from the OCT. Ross treats the α as the main text, relegating the β to an appendix. Most English translations of the *Physics* include a translation of only the α, entirely excluding the β. Like Lang, but contra Wardy and Olshewsky[3], I think that there is no substantive difference between the two versions. But for

[2] Bostock 1996, lxix-lxx writes: "I believe that, if Aristotle had himself prepared his *Physics* for publication, he would have omitted VII altogether. …Aristotle intended the whole of Book vii to be superseded by the whole of Book viii". Simplicius 1.1036.11-12 and his predecessors seem to concur *Phys.* vii's five chapters just seem to be various points about motion and change: on self-motion and infinite chains of movers (vii 1); contiguity between mover and moved (vii 2); alteration takes place only in sensible qualities (vii 3); what makes changes incomparable (vii 4); and the exceptions to the principle that power acting is to weight moved as distance covered is to time taken (vii 5). Moreover, *Phys.* viii draws on many theses and theorems established in previous sections of the *Physics*. It refers back to *Phys.* ii at viii 1.251a8-10; to *Phys.* iii at viii 3.253b7-9 and at viii 5.257a34; to *Phys.* v at viii 8.262a1-2; and to *Phys.* vi at viii 8.263a11-12 and viii 10.267b21. But viii does not *once* refer to vii.

[3] Wardy 1990, 243: "α and β do not draw the same conclusion from VII's unsatisfactory opening argument: according to α, 'this moves itself' entails 'this is moved by something' (e.g. 242a47); according to β, 'this moves itself' entails 'this is moved by something else' (e.g. 242a12-13)." Olshewsky 1995 concurs with Wardy on this point. Lang 1992, 204 dismisses the argument in β, mentioning it only in a footnote: "There are two extant versions of *Physics* vii, one of which is generally accepted as primary. The language in them differs slightly, but the substance of the texts is the same. Hence, all references are to the primary text of *Physics* vii". She follows Simplicius in this regard.

the sake of transparency and thoroughness, I'll give the OCT Greek and my English translations of both versions below.

Aristotle begins *Physics* vii 1 with the claim that everything that is moved must be moved by something. As I shall argue, by "something" Aristotle means something non-identical to the thing in motion. Of course, things can be non-identical in different kinds of ways. I am non-identical to the laundry basket I was carrying earlier today. I am also non-identical to my legs. But unlike my legs, the basket is not one of my parts. Aristotle's claim, as I read it, is that everything that is moved must be moved by something not the same as the very thing in motion, either by something external to the thing in motion or by a proper part (or both).

Aristotle's discussion is divided into (a) a brief discussion of those cases in which the source of the motion is outside the moved thing, and (b) a more detailed discussion of those cases in which the source seems to be inside the moved thing. He begins with (a):

Ἅπαν τὸ κινούμενον ὑπό τινος ἀνάγκη κινεῖσθαι· εἰ μὲν γὰρ ἐν ἑαυτῷ μὴ ἔχει τὴν ἀρχὴν τῆς κινήσεως, φανερὸν ὅτι ὑφ' ἑτέρου κινεῖται; ἄλλο γὰρ ἔσται τὸ κινοῦν. (*Physics* vii 1.α241b35-37)

Everything that is in motion must be moved by something. For if the thing in motion does not have the source of its motion within itself, it is clear that it is moved by something other than itself, for there must be something else that moves it.[4]

Ἅπαν τὸ κινούμενον ἀνάγκη ὑπό τινος κινεῖσθαι· εἰ μὲν οὖν ἐν αὑτῷ μὴ ἔχει τὴν ἀρχὴν τῆς κινήσεως, φανερὸν ὅτι ὑφ' ἑτέρου κινεῖται; ἄλλο γὰρ ἔσται τὸ κινοῦν. (*Physics* vii 1.β241b24-26)

Everything that is in motion must be moved by something. Then if it does not have the source of its motion within itself, it is clear that it is moved by something other than itself, for there must be something else that moves it.

The text does not provide any examples. But consider my laundry basket when I carry it to the laundry room outside my apartment building. It is obvious that the source of the laundry

[4] All English translations are my own unless otherwise noted.

basket's motion (τὴν ἀρχὴν τῆς κινήσεως) is not the same as the basket: I am the source of its motion, and it is clear that (φανερὸν ὅτι) I am not the same thing as my laundry basket. The basket's motion does not come about from the basket alone.

The harder cases are those in which the source of the motion is non-identical but internal to – that is, a proper part of – the thing in motion. These cases preoccupy most of Aristotle's defense of his thesis, to which I now turn. What moves me when I carry my laundry basket? At the very least, all mobiles are moved in the following way:

εἰ δ' ἐν αὑτῷ, ἔστω [τὸ] εἰλημμένον ἐφ' οὗ τὸ ΑΒ ὃ κινεῖται καθ' αὑτό, ἀλλὰ μὴ <τῷ τῶν> τούτου τι κινεῖσθαι. πρῶτον μὲν οὖν τὸ ὑπολαμβάνειν τὸ ΑΒ ὑφ' ἑαυτοῦ κινεῖσθαι διὰ τὸ ὅλον τε κινεῖσθαι καὶ ὑπ' οὐδενὸς τῶν ἔξωθεν ὅμοιόν ἐστιν ὥσπερ εἰ τοῦ ΚΛ κινοῦντος τὸ ΛΜ καὶ αὐτοῦ κινουμένου εἰ μὴ φάσκοι τις τὸ ΚΜ κινεῖσθαι ὑπό τινος, διὰ τὸ μὴ φανερὸν εἶναι πότερον τὸ κινοῦν καὶ πότερον τὸ κινούμενον· εἶτα τὸ μὴ ὑπό τινος κινούμενον οὐκ ἀνάγκη παύσασθαι κινούμενον τῷ ἄλλο ἠρεμεῖν, ἀλλ' εἴ τι ἠρεμεῖ τῷ ἄλλο πεπαῦσθαι κινούμενον, ἀνάγκη ὑπό τινος αὐτὸ κινεῖσθαι. τούτου δ' εἰλημμένου πᾶν τὸ κινούμενον κινήσεται ὑπό τινος. ἐπεὶ γὰρ εἴληπται [τὸ] κινούμενον ἐφ' ᾧ τὸ ΑΒ, ἀνάγκη διαιρετὸν αὐτὸ εἶναι· πᾶν γὰρ τὸ κινούμενον διαιρετόν. διῃρήσθω δὴ κατὰ τὸ Γ. τοῦ δὴ ΓΒ μὴ κινουμένου οὐ κινηθήσεται τὸ ΑΒ. εἰ γὰρ κινήσεται, δῆλον ὅτι τὸ ΑΓ κινοῖτ' ἂν τοῦ ΓΒ ἠρεμοῦντος, ὥστε οὐ καθ' αὑτὸ κινηθήσεται καὶ πρῶτον. ἀλλ' ὑπέκειτο καθ' αὑτὸ κινεῖσθαι καὶ πρῶτον. ἀνάγκη ἄρα τοῦ ΓΒ μὴ κινουμένου ἠρεμεῖν τὸ ΑΒ. ὃ δὲ ἠρεμεῖ μὴ κινουμένου τινός, ὡμολόγηται ὑπό τινος κινεῖσθαι, ὥστε πᾶν ἀνάγκη τὸ κινούμενον ὑπό τινος κινεῖσθαι· ἀεὶ γὰρ ἔσται τὸ κινούμενον διαιρετόν, τοῦ δὲ μέρους μὴ κινουμένου ἀνάγκη καὶ τὸ ὅλον ἠρεμεῖν (α241b37-242a49).

But if [the thing in motion has the source of its motion] in itself, then take AB to represent that which is in motion in itself and not by the motion of something belonging to it. First, then, to assume that AB is moved by itself because the whole is in motion without being moved by anything external to the whole is similar to the following: if KL is moving LM and KL is itself in motion, if we deny that KM is moved by something because it is not clear which is the mover and which is the moved. Second, something in motion without being moved by anything ought not to stop moving just because something else is at rest; does not necessarily stop from moving because of the rest of something else; but if something comes to rest because something else ceases to move, then [the thing that is brought to a rest because something else ceases to move] must be moved by something. With this principle accepted, it follows that everything that is in motion is moved by something. For, since it has been assumed that AB is in motion, it must be divisible. For everything that is in motion is divisible. So let it be divided at C. If CB is not moving, AB will no longer move. For if [AB] were in motion, it is clear that AC would be in motion while CB rests, so that AB would not be in motion in itself and primarily. But AB was assumed to be in motion in itself and primarily. Therefore with CB no longer in motion AB must rest. But if it rests because

something is no longer moving [the thing brought to rest because something else is no longer moving] was agreed to be moved by something, so that everything that is in motion must be moved by something. For the thing in motion will always will be divisible, and with a [proper] part's not being in motion the whole must also rest.

εἰ δ' ἐν αὐτῷ, εἰλήφθω ἐφ' οὗ τὸ ΑΒ, ὃ κινεῖται μὴ τῷ τῶν τούτου τι κινεῖσθαι. πρῶτον μὲν οὖν τὸ ὑπολαμβάνειν τὸ ΑΒ ὑφ' αὑτοῦ κινεῖσθαι διὰ τὸ ὅλον τε κινεῖσθαι καὶ ὑπὸ μηθενὸς τῶν ἔξωθεν ὅμοιόν ἐστιν ὥσπερ ἂν εἴ τις τοῦ ΔΕ κινοῦντος τὸ ΕΖ καὶ αὐτοῦ κινουμένου ὑπολαμβάνοι τὸ ΔΕΖ ὑφ' αὑτοῦ κινεῖσθαι, διὰ τὸ μὴ συνορᾶν πότερον ὑπὸ πότερου κινεῖται, πότερον τὸ ΔΕ ὑπὸ τοῦ ΕΖ ἢ τὸ ΕΖ ὑπό τοῦ ΔΕ. ἔτι τὸ ὑφ' αὑτοῦ κινούμενον οὐδέποτε παύσεται κινούμενον τῷ ἕτερόν τι στῆναι κινούμενον. ἀνάγκη τοίνυν, εἴ τι παύεται κινούμενον τῷ ἕτερόν τι στῆναι, αὐτὸ ὑφ' ἑτέρου κινεῖσθαι. Τούτου δὲ φανεροῦ γενομένου ἀνάγκη πᾶν τὸ κινούμενον κινεῖσθαι ὑπό τινος. ἐπεὶ γὰρ εἴληπται τὸ ΑΒ κινούμενον, διαρετὸν ἔσται· πᾶν γὰρ τὸ κινούμενον διαρετὸν ἦν. διῃρήσθω τοίνυν ᾗ τὸ Γ: ἀνάγκη δὴ τοῦ ΓΒ ἠρεμοῦντος ἠρεμεῖν καὶ τὸ ΑΒ. εἰ γὰρ μή, εἰλήφθω κινούμενον. τοῦ τοίνυν ΓΒ ἠρεμοῦντος κινοῖτο ἂν τὸ ΓΑ. οὐκ ἄρα καθ' αὑτὸ κινεῖται τὸ ΑΒ: ἀλλ' ὑπέκειτο καθ' αὑτὸ κινεῖσθαι πρῶτον. δῆλον τοίνυν ὅτι τοῦ ΓΒ ἠρεμοῦντος ἠρεμήσει καὶ ΒΑ, καὶ τότε παύεται κινούμενον. ἀλλ' εἴ τι τῷ ἄλλο ἠρεμεῖν ἵσταται καὶ παύεται κινούμενον, τοῦθ' ὑφ' ἑτέρου κινεῖται. φανερὸν δὴ ὅτι πᾶν τὸ κινούμενον ὑπό τινος κινεῖται· διαρετὸν τε γάρ ἐστιν πᾶν τὸ κινούμενον, καὶ τοῦ μεροῦς ἠρεμοῦντος ἠρεμήσει καὶ τὸ ὅλον (β241b26-242a15).

But if the thing in motion has the source of its motion in itself, then take AB to represent that which is in motion not because something belonging to it is in motion. First, then, to assume that AB is moved by itself because AB as a whole is moved by nothing outside AB is similar to the following: if DE were moving EF and were itself in motion, and someone were to assume that DEF is moved by itself because he could not detect which is moved by which, whether DE is moved by EF or EF by DE. Second, something moved by itself will not cease from moving just because another thing stops moving. Therefore it is necessary that if something ceases from moving because of another thing's having stopped, it is moved by something other than itself. With this made clear, it follows that it is necessary that everything that is in motion is moved by something. For since it has been assumed that AB is in motion, AB will be divisible; for everything that moves is divisible. Therefore let AB be divided at C. Then it is necessary that, with CB being at rest, AB will be at rest too. For if this were not the case, let us assume that [AB] is in motion. Then, if this were the case, CB would at rest while CA would be in motion. So AB is not moving in itself. But it was assumed that AB is in motion in itself and primarily. Therefore it is clear that if CB is at rest, BA will also be at rest, and will cease from moving. But if something ceases from moving because something else rests, then it is moved by something not the same as itself. So it is clear that everything that is in motion is moved by something. For everything that is in motion is divisible, and with a [proper] part's being at rest the whole will also be at rest.

Aristotle's first point is that if we assume that AB is moved by itself, it does not follow that

AB is not moved by anything (non-identical to AB). For compare AB to the case of KM,

which can be divided into two parts: KL and LM. Suppose that KL is moving LM, and that KL is itself in motion. One could not "deny that KM is moved by anything on the ground that it is not evident which is the part that is moving it and which the part that is moved"; as long as we assume that *some* part is moving the other part, and the whole, it still follows that KM – and AB – are being moved by something.

Aristotle then argues for his thesis by assuming the opposite: that something can be in motion without being moved by anything. He tries to argue that, contrary to the assumption, it *must* be moved by something, if something else's ceasing to be in motion causes it to be at rest. That fact shows that it is moved by something else. The argument goes as follows: Assume AB is in motion (without being moved by anything). It must be divisible (already established in *Phys.* vi 4 and vi 10). Let it be divided at C, so that we have two lengths: AC and CB. Take one of the two parts: CB. Suppose that CB is not in motion. Then it follows that AB will not be in motion. Why? Suppose the whole AB *is* in motion while CB is not in motion. Then AC (which is the other part of AB) would be in motion while CB is at rest. It would follow from this assumption that AB cannot be in motion in its own right and primarily – because its motion would be derived from AC's motion. But this goes against the assumption that AB is itself in motion in its own right and primarily. Therefore, if CB is not in motion, then the whole AB will be at rest. But a thing that is at rest if something is not in motion must be moved by something.

In a more concise, skeletal form, here is how I see the argument Aristotle gives for his thesis as applied to the hard cases:

Premise 1 (P1): All things that are in motion must also be things that are divisible; that is, all mobiles must have proper parts.[5]

[5] By "proper part" I mean "a part other than the whole". One might think this usage is anachronistic, since it is not clear that Aristotle would have distinguished between "part" and "proper part". But, first, Aristotle was acutely aware that a whole is more than the mere sum of its parts (e.g. *Topics* 13.150a15-21).

P2: All things that have proper parts must also be things that stop moving when one of their proper parts stops moving.

P3: All things that stop moving when something not the same as the thing in motion (such as a proper part) stops moving must also be things that are moved by something not the same as the very thing in motion.

Conclusion: All things that are in motion must also be things that are moved by something not the same as the very thing in motion.

The argument has puzzled commentators since antiquity, and has provoked criticism from Galen, Alexander, Simplicius, Avicenna, Averroes, Ross, Bostock, and Wardy. Wardy 1990, 114, for example, calls the argument a "fallacious if conveniently brisk and simple opening gambit".[6] This is in large part because of P3, which appears to be false. And on the prevailing interpretation of the argument, Aristotle is here rejecting the possibility of self-motion. Yet throughout texts such as *Physics* viii, *De Anima* iii 9-11, and *De Motu Animalium* (not to mention the biological works), it is clear that Aristotle takes human and non-human animals to be self-movers. I will argue that Aristotle argues merely against unqualified self-motion, leaving open the possibility of self-motion in qualified senses (Section 2). I'll defend P3, the argument's most controversial premise (Section 3). And I'll explore some useful implications of my reading, especially with respect to distinguishing Platonic self-motion from Aristotelian self-motion (Section 4).

Second, the point of my using the term "proper part" is to make clear to a contemporary audience what Aristotle has in mind. Third, there are five senses of part (μέρος) given in the *Metaphysics* v 25.1023b12-25. One of those senses is that into which a quantity can in any way be divided.

[6] Helen Lang 1992, 35-44, 204-208 gives a careful and charitable reading of α's version of vii's opening argument. Lang emphasizes the historical and, in particular, the anti-Platonic context of the argument in the α (though she ignores the β). I analyze the argument through principally philosophical and exegetical means. Thus I will show that there are good philosophical and text-based reasons to think that the argument does not swear off self-motion altogether. Also, Lang does not say much about how to incorporate her reading of the argument into Aristotle's more general account of self-motion, whereas this is one of my aims here. Coope 2015, 245-264 focuses on *Phys*. viii 5, but also gives some brief (262-263) but insightful attention to viii 5's connection with vii 1's argument.

A note on how, precisely, my discussion is original: First, *Physics* vii's opening argument has escaped any serious attention in the literature on Aristotle's account of self-motion – see Berryman 2002, Broadie 1982, 204-261, Coope 2015, 245-264, Corcilius and Gregoric 2013, Freeland 1994, Furley 1978, Gill 1994, Meyer 1994, and Morison 2004. The literature focuses on other highly relevant texts such as *De Anima* iii 9-11, *De Motu Animalium*, and *Physics* viii. In that sense, what I offer here is original. Second, the argument against unqualified self-motion in *Physics* vii 1 differs in interesting ways from Aristotle's other relevant arguments. In that sense, too, my discussion is original. But the broad philosophical problem I address here – that is, how Aristotle's arguing that everything is moved by something (else) is compatible with his clear endorsements of self-motion – receives careful attention in much of the literature. And the main solution I offer – that is, Aristotle argues against unqualified self-motion, but does not rule out the possibility of self-motion in other senses – does find support in, for instance, Berryman 2002 and Morison 2004, in their readings of other relevant texts. Principally their interest is *Physics* viii. Berryman 2002, 85, 97 argues that by self-motion Aristotle means exclusively voluntary self-locomotion in animals, that a "causal 'fresh start'" is not required for animal motion to count as self-motion, that "Aristotle's reason for calling animals self-movers is the simple fact that they, unlike inanimate things, are able to move locally in response to other kinds of change" whereas other kinds of change are preceded by local changes, and that Aristotle's account uses *sumphuton pneuma* as the stuff that can convert qualitative into local change so as to give animals their unique capacity for self-motion. Morison 2004, 75 also argues for a qualified reading of Aristotle's account of self-motion, one on which, within a self-moving animal:

> There is an unmoved part which moves the rest of the animal – this much we know from the fact that an animal does not move itself properly speaking, since one part moves another. But in that case, the unmoved part (which moves the other part) ends up moving accidentally (259b18) along with the organism as a whole. However, it is *just this* which is the crucial point for Aristotle's argument, and which defuse the threat posed by

animals to his argument of *Physics* viii 6. For Aristotle goes on to claim: "we may be sure that if a thing belong to the class of unmoved things which move themselves accidentally, it is impossible that it should cause continuous motion" (259b20-22)

On the one hand, then, *Physics* vii 1 and its argument have yet to be taken seriously in the literature on Aristotle's account of self-motion, and I think the argument in that text has useful implications and is interesting enough in its own right to merit careful study. On the other hand, in a broad, philosophical sense, the tension I address is well known, and the solution I offer enjoys support from other scholars' readings of other texts.

II. DOES ARISTOTLE RULE OUT THE POSSIBILITY OF SELF-MOTION?

One might think that *Phys*. vii's opening argument establishes that nothing can move itself, that there are no self-movers.[7] Though Wardy 1990, 114 has a slightly different reading of the argument in the α and a markedly different reading of the argument in the β, he concludes, "in the *Physics* vii 1 all apparent self-movers are treated as problematic". And while she focuses on *Physics* viii rather than vii, Sarah Broadie 1982, 204 argues that "if Aristotle is in general elusive on the subject of agency and its connection with change, nowhere is he more so than when treating of the mysterious concept of something's 'changing (transitive) itself', or 'being changed by itself'". For, Broadie, 209, worries, "if

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[7] There is a problem for translators in relation to the noun κίνησις and the verb κινέω throughout the *Physic*s (and elsewhere), that is, whether to translate them as "change" and "to change" or as "motion" and "to move" (or whatever best fits the tense, number, voice, etc. of the particular Greek locution). Aristotle sometimes uses μεταβολή and κίνησις together and somewhat interchangeably to refer to change in a broad sense, under which change of place, change of quantity and change of quality – and, earlier on in the *Physics* and elsewhere in the Corpus, change in substance – are included, just as Plato does in the *Republic, Cratylus, Timaeus*, and the *Phaedo*. I use "motion" rather than "change" here for two main reasons. First, Aristotle argues that there is no κίνησις in respect of substance [Κατ' οὐσίαν δ' οὐκ ἔστιν κίνησις] because substance has no contrary among things that are (*Phys*. v 2.225b10-11). (For a much richer study of this section of the *Physics*, see Rosen 2012.) Aristotle argues for the same conclusion in his *Metaphysics* xi 11-12 (e.g. xi 12.1068a8-10). Yet for Aristotle μεταβολή certainly *does* include generation and destruction (changes in substance). So, in *Physics* vii, it seems safe to infer that Aristotle has a more specific sense in mind for κίνησις than what might well be implied in earlier sections of the *Physics*. Second, Aristotle argues that locomotion [φορά] or change in place [κατὰ τόπον] is primary or first [πρῶτον] among all types of change in all three senses of priority: (1) changes in place don't require change in quality or quantity but changes in quantity or quality do require change in place (260b15-19); (2) change in place (specifically, circular motion, cf. *Physics* viii 8) is the only kind of change possible for eternal things (260b19-29); and (3) change in place is prior according to nature, since the last thing developed by natural things in attaining their complete form is the capacity for locomotion (260b29-261a12).

changer must differ from changed, how can 'X changes itself' escape being nonsensical or self-contradictory?" Guthrie 1939, xvii writes that for Aristotle "self-motion is impossible". Aquinas also made such an assumption – see his *Commentary on Aristotle's "Physics"* viii 4, *lectio* 7; *Commentary on the "Sentences"* I d.8 q.3 art.1; *Summa contra gentiles* 1.13; *Summa theologiae* 1a q.2 art.3; *Quaestiones disputatae de veritate* q.22 art 3; *Compendium theologiae* chap. 3. One might be tempted to agree with such readings: Aristotle is arguing that self-motion is altogether impossible.

The trouble with that interpretive option is that *Physics* vii 2, viii 2, viii 4, viii 5, viii 6, and viii 7 (not to mention passages throughout the biological works, in most of *De Motu Animalium*, and in sections of *De Anima* such as iii 9-11) seem to endorse the claim that self-motion is possible, as well as the stronger claim that there are real things in the world (namely, animals) which are self-movers. Consider, for example, the following:

Everything in motion is moved either by itself [ὑφ' ἑαυτοῦ] or by something else [ὑπ' ἄλλου]. Now, where self-movers [αὐτὰ ὑφ' αὑτῶν κινεῖται] are concerned it is obvious that the moved object [τὸ κινούμενον] and the agent of movement [τὸ κινοῦν] are contiguous; after all, the immediate agent is within the thing moved, so there is nothing in between (*Phys.* vii 2.243a11-14).

If vii 1's argument concerning self-motion is supposed to show that self-motion is altogether impossible, then Aristotle appears to blatantly contradict himself immediately afterwards: self-motion is endorsed in vii 2 *for the same reason* it was rejected in vii 1.[8] Elsewhere Aristotle writes: "Now we determined before, in our discussion of eternal motion, that the origin of other movements is that which moves itself [αὐτὸ ἑαυτὸ κινοῦν]…" (*De Motu* 1.698a8-9); "the animal, on the other hand, we say, moves itself [τὸ δὲ ζῷον αὐτό φαμεν ἑαυτὸ κινεῖν]

[8] Wardy writes that this "easy dismissal is troubling" in part because "it might seem directly to contradict ch.1's initial argument. There (241b34-7/241b24-6), things moved by something else pose no difficulty and are immediately dismissed, while ostensible self-movers are problematic; here, the order is reversed, despite ch.1's conclusion that nothing strictly speaking is a self-mover (1990: 125)." As I explain in the main text, there are good reasons to think that Aristotle does not treat self-movers as problematic.

(*Phys*. viii 2.252b23); and "it is evident from actual observation that there are things that have the characteristic of moving themselves [κινεῖ αὐτὰ ἑαυτά], e.g. the animal kingdom and the whole class of living things" (*Phys*. viii 6.254b2-4). Aristotle certainly seems committed to the claim that self-motion is possible and to the much stronger claim that there are many examples of self-movers (animals) in the world. Yet vii 1's discussion of self-motion seems to argue that self-motion is altogether impossible. One way to avoid the conflict would be to take a Jaeger-inspired, developmentalist line and say that this is a very different, perhaps a much younger Aristotle (so Olshewsky 1995), or we have to effectively ignore the argument since it apparently does not reflect any of Aristotle's genuine views.

In my view, we do not need to use either of those options. Instead, we should see that the argument under discussion does not conflict with Aristotle's frequent endorsements of self-motion. Suppose I argue that there is a non-trivial sense in which everything that is lifted must be lifted by something non-identical to the thing that is lifted. That is consistent with saying that when people do chin-ups, push-ups, and so on, people do in a sense *lift themselves*. When a dog uses enough force to put its front legs on a dinner table and get its head onto the table, the dog does in a sense lift itself. All of this is compatible with holding that when we say that things lift themselves we acknowledge that their lifting themselves is qualified in at least one way: the thing's lifting itself depends on its proper parts (and, in particular, on whether they are in motion).

The standard reading – on which *Phys*. vii's opening argument swears off self-motion altogether – is further undermined in the context of ordinary generalizations that we take to be true. We generally say, for instance, that people are capable of motivating themselves. But we also acknowledge that even cases of self-motivation often involve or even require an external object of motivation that plays some role in the motivation. We also generally say

that some animals are capable of feeding themselves. That is compatible with saying that animals require food itself together with a properly functioning digestive system and mouth in order to feed themselves. If the animal's mouth stops working then the animal cannot feed itself. Similarly, the animal requires an external source of food in order to feed itself. Those are reasonable qualifications on the generalization that some animals are capable of feeding themselves. But the generalization still seems accurate.

In this context, then, it is the standard reading rather than Aristotle's qualifications that look suspect. Arguing that there is at least one qualification on self-motion does not entail that *self*-motion is impossible. This would be like arguing that since picking oneself up off the floor and jumping onto a chin up bar requires earth's gravitational constant to not start to behave erratically, it follows that no one can pick themselves up or lift themselves. To insist that self-motion can only be properly called 'self-motion' and only strictly be 'self-motion' if the motion therein is utterly free of all non-self-related qualifications is by reasonable contemporary standards needlessly unequivocal thinking. It is also profoundly anti-Aristotelian thinking: Aristotle is notoriously careful in delineating the different senses in which claims can be true and properties can hold.

Moreover, consider Aristotle's discussion in *De Anima* iii 9-11 of the moving factor in the soul (τῆς ψυχῆς) responsible for animals' unique ability to start local movement (κινεῖν τὴν κατὰ τόπον κίνησιν) (*De An.* iii 9.432a16-19). He argues that an animal is self-moving insofar as it is appetitive (ᾗ ὀρεκτικὸν τὸ ζῷον, ταύτῃ αὑτοῦ κινητικόν) (*De An.* iii 10.433b27-28). In particular, an animal is able to start its own locomotion because the animal's soul has two moving factors (ταῦτα κινοῦντα), namely, desire (ὄρεξις) and thought (νοῦς). Thought refers to imagination (φαντασία), which is present in all human and non-human animals capable of starting their own locomotion – calculation or intellectual

knowledge is present only in human beings (ἐν τοῖς ἄλλοις ζῴοις οὐ νόησις οὐδὲ λογισμὸς ἔστιν) (iii 10.433a9-12). Nowhere does Aristotle suggest that since an animal's capacity for self-motion is dependent on its soul's capacity for desire (τὸ ὀρεκτικόν) and ultimately on an external object of desire (τὸ ὀρεκτόν), it follows that the animal is not really a self-mover.[9] On the contrary, Aristotle argues that it is *precisely because* the souls of (most) animals have this part and power capable of responding to and moving the rest of the animal toward an external stimulus that they are capable of self-motion and rightly called self-movers.[10]

My reading entails that the conclusion of *Phys*. vii's opening argument is not necessarily in tension with Aristotle's other discussions of self-motion. When Aristotle endorses self-motion, from the endorsement immediately following vii 1 (early on in vii 2) to the various endorsements in *Physics* viii, in *De Anima*, and in *De Motu Animalium*, he is taking it for granted that self-motion in its unqualified sense is impossible:

Unqualified Self-Motion $=_{df}$ a thing is moved by itself (ὑφ' ἑαυτοῦ) in the sense that everything required for its motion is identical to it. In short: something X is self-moving if and only if X is moved only by X.

On my reading, then, *Phys*. vii's opening argument attacks Unqualified Self-Motion. That Unqualified Self-Motion is impossible does not entail that self-motion in any number of its qualified senses is impossible. So, returning to the purported contradiction between vii 1 and

[9] Aristotle distinguishes "the faculty of desire" (τὸ ὀρεκτικόν) from "the object of desire" (τὸ ὀρεκτόν) by the suffix "ικον" (*ikon*). As Shields 2006, xxix notes, this is common practice in Aristotle's Greek, though there are sometimes contradictions in the manuscripts as to (a) whether the "ikon-version" of the word ought to be in the Greek (as a glance at the apparatus criticus in the OCT for this very text will help to show) and (b) how best to understand the distinction.

[10] One might think that Aristotelian self-motion is not restricted to voluntary self-locomotion in animals. For on Aristotle's account, plants have souls that give them nutritive, growing, and reproductive functions. Also, plants bloom and change color, and those changes seem like self-changes. In addition, one might argue, immobile animals (e.g. a species of sea anemone, described in Aristotle's biological works) lack the capacity for voluntary self-locomotion and yet seem capable of self-changes. The reading I offer here is compatible with those suggestions, though I worry that they conflate natural change with self-change – Aristotle clearly wants to separate them (see *Physics* viii 4).

vii 2 on self-motion, vii 2 can now be read as endorsing self-motion in a weaker sense than self-motion$_1$. Call it Qualified Self-Motion:

Qualified Self-Motion $=_{df}$ a thing is moved by itself (ὑφ' ἑαυτοῦ) even though there is at least one sense in which its motion must depend on something not identical to it: the continued motion of each of its proper parts.

So, vii 2 merely follows vii 1's conclusion concerning self-movers. It infers that in self-movers there is contiguity between the active mover and the passive mover owing to the fact the active mover is part of the thing that is moved, namely, the whole. I am contiguous with my legs, and with each of my other parts. So if I, an animal, engage in self-motion as Aristotle describes in *Physics* viii, *De Motu Animalium* and elsewhere, then my self-motion is qualified in at least one way: my motion is dependent on something not the same as me, namely, the motion of each of my proper parts.

Of course, this does not entail that Aristotle is free to add any number of qualifications on self-motion and still consider it self-motion. I can add many qualifications to the motion of my kettle when I pick up my kettle without having any license whatsoever to call the motion of my kettle 'self-motion'. And there might be a point at which adding other-related qualifications to animal self-motion overwhelms the autonomous qualities that normally make us consider animals capable of moving themselves (that animals have complex physical parts, means of voluntary self-locomotion, imagination, desire, sensation, and so on). But, as it stands, Aristotle has introduced merely one basic qualification on self-motion, and I see good reasons for rejecting the reading that says that the argument swears off self-motion altogether.

III. A DEFENSE OF P3, THE VITAL PRINCIPLE

P3 in the α: Second, something in motion without being moved by anything does not necessarily stop from moving just because of the rest of something else; but if something

rests because something else stops moving, then [the thing that is brought to a rest when something else ceases to move] must be moved by something (α242a1-3).

P3 in the β: Second, something moved by itself will not cease from moving just because another thing stops moving. Therefore it is necessary that if something ceases from moving because of another thing's having stopped, it is moved by something other than itself (β241b33-242a3).

Commentators seem to think that P3 is by far the most controversial premise in the *Physics* vii's opening argument. Consider, for example, Bostock 1996, 281:

The principle is: if it is true that when *x* stops changing so does *y*, then *y*'s change is caused by something (else). This sounds plausible, because the thought seems to be that *y*'s change is caused by *x*'s change, or perhaps by some larger change of which *x*'s change is a part. But Aristotle will apply the principle to the case when *x* is itself a part of *y*, and in this application the principle is clearly quite unreasonable.

Ross 1979, 669, is very critical as well, and spells out his concerns in more detail:

It is true that the movement of a whole AB involves the movement of a part CB, since if CB were at rest not AB but at most only the remaining part AC would be in motion. But Aristotle makes the mistake of supposing that this implies the causal dependence of the movement of AB on the movement of a part of itself CB. That this is false is shown by the fact that it is equally true that if AC were at rest AB could not be in motion, so that AB's motion, if it were causally dependent on that of CB, would be equally dependent on that of AC. The fact is that the general principle laid down in 241b44-242a37 is valid if ἄλλο means something outside the thing in question, but not valid if ἄλλο is taken to refer to a part of the thing in question; then the motion of the whole logically implies the motion of the part, but is not necessarily causally dependent on it.

Wardy 1990, 97, 112, worries that "Aristotle has simply muddled up necessary conditions with agents" and that "the argument seems to play on a gross equivocation, slipping from the innocuous claim that the whole's motion depends on that of its part (AB stops along with BC) to the unwarranted assertion that the whole is moved by something other than itself". These and other commentators worry that it is fallacious to infer that since the whole is in some sense moved by its (proper) part it follows that the whole is moved by something other than itself. Just because the part's motion is a necessary condition for the whole's motion it does not follow that the whole's motion is causally dependent on an agent other than the whole.

It seems to me that the objections described above are confused on two main fronts. First, the objections presuppose that Aristotle requires a separately existing agent to be the

(transitive) mover of the moved thing. But the text does not warrant that presupposition. Some commentators are impressed by the fact that ἕτερόν ('different' or 'another') appears twice in β's version in the passage above, used to describe the agent of the motion, whereas α seems to use a far weaker and more general descriptor for the agent: in α's genitive of agent, ὑπό τινος κινεῖσθαι, an unqualified indefinite (τι, 'something'), is the agent. There is a third instance of ἕτερόν later on in β, and again it is absent from the corresponding section of α:

ὃ δὲ ἠρεμεῖ μὴ κινουμένου τινός, ὡμολόγηται ὑπό τινος κινεῖσθαι. = But if it rests by something no longer moving, it was agreed to be moved by something (α242a45-6).

ἀλλ' εἴ τι τῷ ἄλλο ἠρεμεῖν ἵσταται καὶ παύεται κινούμενον, τοῦθ' ὑφ' ἑτέρου κινεῖται. = But if something ceases from moving by something else's resting, then it is moved by something else (β242a12-13).

Since there thus appear to be three instances in which α has 'something' (τι) as its agent, whereas β has 'something else' (ἕτερόν) as its agent, commentators such as Olshewsky and Wardy infer that β intends to prove that all mobiles are moved by something *else*, whereas α intends to prove that all mobiles are moved by *something*.

However, in the first of the three instances where β has ἕτερόν, α has ἄλλο ('another') as the agent of motion (α241b44, quoted above). So, Aristotle might very well take this connotation to be implicit each time he uses an indefinite to express the agent of motion. Further, following both of the passages quoted above, and each time we find ἕτερόν ('something else') present in β but absent from α, Aristotle states the same consequence in both versions. After the statement of the general principle, that is, P3, Aristotle states what he takes to follow P3 (together with P1 and P2):

τούτου δ' εἰλημμένου πᾶν τὸ κινούμενον κινήσεται ὑπό τινος. = With this principle accepted, it follows that everything that is in motion is moved by something (α242a37-8).

τούτου δὲ φανεροῦ γενομένου ἀνάγκη πᾶν τὸ κινούμενον κινεῖσθαι ὑπό τινος. = With this made clear, it follows that it is necessary that everything that is in motion is moved by something (β242a3-4).

Notice that there is no mention of ἕτερόν in β. Rather, β has an indefinite (τι) as the agent of motion, just as in the case of α. The same can be found in the text immediately following the third instance where ἕτερόν is present in β but absent from α:

ὥστε πᾶν ἀνάγκη τὸ κινούμενον ὑπό τινος κινεῖσθαι = So that everything in motion must be moved by something (α242a45-6).

φανερὸν δὴ ὅτι πᾶν τὸ κινούμενον ὑπό τινος κινεῖται = So it is clear that everything that is in motion is moved by something (β242a13-14).

Both versions once again use an unqualified indefinite to express the agent of motion, rather than something as strong and specific as 'something else', that is, a distinct agent.

Second, the objections to P3 seem to gloss over the fact that it is not at all clear that the condition in P3 is necessary and not sufficient. If none of my proper parts stops moving then it seems as though my motion as a whole is guaranteed. This hinges on a difference in the type of *selection* in P3. Take my right arm alone. Call that CB. The rest of me is AC. As a whole I am AB. Suppose that CB stops moving. But AC continues moving. Then AB is no longer moving in the first instance (primarily) and in its own right. So we can say that the motion of CB, and in particular the non-stopping of CB, is in a sense a necessary but not sufficient condition for my continued motion. Had CB continued moving with the rest of me, another one of my parts, such as AC, might have stopped moving. But if CB is *arbitrarily selected* from the domain of all proper parts of the whole in question, which certainly seems to be the case in the context of the *Physics* vii's opening argument, then what is true of CB is true of all proper parts. And it is true that if all of the proper parts of a whole do not stop moving then the whole must also continue moving. In that sense, then, the continued motion of every proper part is sufficient for the whole's motion. Even if the necessary

condition fails to be sufficient, since Aristotle does not require a distinct agent for the whole's motion it follows that the argument shows that the whole's motion is in a sense moved by something non-identical to the whole.

IV. IMPLICATIONS FOR ARISTOTELIAN SELF-MOTION

I'll discuss two useful implications of my reading of *Physics* vii's opening argument for Aristotelian self-motion. First, if in *Physics* vii 1 Aristotle is arguing only against unqualified self-motion rather than self-motion of any kind at all (such as self-motion in a more qualified, plausible sense), we can more incisively draw a distinction between Aristotelian self-motion and Platonic self-motion. In Plato's *Phaedrus* 245c-246e, Socrates describes the soul as a self-moving thing and an imperishable, ungenerated source of motion for all other moved things. Socrates argues that since it is clear that things with souls have internal sources of motion, whereas things without souls are moved by something outside them, what it is to be a soul is at least in part to be something capable of self-motion.[11] In Plato's *Laws* 896a-897d, the Athenian Stranger reaffirms that the soul is a source of motion, connects life with the capacity for self-motion, and argues that self-motion must be the first kind of motion.[12]. On Plato's account, everything that moves ultimately owes its motion to a self-mover, and self-movers necessarily do not owe their motion to anything else. There is widespread agreement in the literature that Aristotle rejects Plato's account. But there is much less agreement as to how, precisely, Aristotle aims to do so, and whether he does so through sound arguments.

On my reading of *Physics* vii 1.α241b35-242a49 / β241b25-242a15, in order to clearly distinguish Aristotelian self-motion from Platonic self-motion, it is not necessary to turn to

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[11] For more careful analyses of this passage see Bett 1986, 3 and Blyth 1997, 196f.

[12] For a detailed discussion of the relation between these two passages see Skemp 1942, 112. Kelsey 2004 argues that both passages do not push for the immortality of individual souls but, rather, for the immortality of "a kind of 'world soul' – some kind of universal source of all the world's motion".

familiar but controversially established claims such as: (1) those in *De Anima* concerning the soul-body relation, such as (a) the claim that the soul moves the body, (b) the soul is never moved in itself but only accidentally, (c) the soul's faculty of desire and faculty of imagination initiate self-motion, though (d) those soul-faculties always require a perceived external object of desire in order to initiate motion in the animal; or (2) Aristotle's arguing in *Physics* viii 2.253a11-21 and viii 6.259b1-16 that (a) animals can change themselves only with respect to locomotion and not any other kind of motion or change, and (b) self-motion is always dependent on and affected by changes going on inside and outside the animal (growth, decay, digestion, respiration, environmental conditions) that are not in the animal's control. Aristotle's argumentation in *Physics* vii is compatible with any of those claims. But *Physics* vii 1's way of qualifying self-motion is also much simpler and more general. It hinges merely on the divisibility of any mover (self-mover or not), resulting in the dependence of that divisible whole's motion on the kinetic state and, in particular, the non-rest of each of its proper parts.[13]

While comparatively straightforward, the distinction between Platonic self-motion and Aristotelian self-motion that my reading of *Phys.* vii 1 makes clear is an emphatic way in which Aristotle chooses to contradict Plato. As Ursula Coope 2015, 248 observes, as a response to Plato's arguing that the ultimate cause of motion is an unqualified self-motion, Aristotle could have simply claimed "that such a cause would not be able to produce eternal continuous motion". Instead, Aristotle has a more radical objection: "no origin of movement could be a self-causing movement, and hence Plato's account is mistaken *even as an account of self-motion*" (ibid). Aristotle supports not just the weaker claim that Platonic self-

[13] Aristotle argues in *Physics* vi 10.240b8-241a27 that something without parts (ἀμερὲς) cannot be in motion on its own account but only accidentally (κατὰ συμβεβηκὸς); cf. *Phys.* vi 4.

motion, embodied in an unqualifiedly self-moving soul, is unnecessary as an explanation of the beginning of motion, but, also, the much stronger claim that Platonic self-motion *cannot* explain the beginning of motion. For, as Aristotle shows in *Phys.* vii 1, everything that moves must be moved by something else. At the very least, every moving thing must be moved by something else inside it, namely, a proper part (τι). A fortiori, every self-moving thing must be moved by something inside it, namely, a proper part (τι). So, by reading *Phys.* vii 1 in the way I suggest, we find Aristotle arguing not merely that Platonic souls are redundant as origins of causal chains of movers, but, in addition, that Platonic souls are conceptually incoherent. This helps to explain why there are no concrete examples given in *Phys.* vii 1's discussion of self-motion, nor even any concrete restrictions on the types of things under consideration (unless divisibility is considered a concrete restriction). For Aristotle intends to attack not just the application of Platonic self-motion, but also its basic, underlying assumption: that unqualified self-motion is possible.

Second, my reading of *Physics* vii's opening argument can shed light on how to resolve tension between many of Aristotle claims concerning self-movers, especially in *Physics* viii. One of the main problems in understanding Aristotle's account of self-motion is how to reconcile passages in which he seems to endorse the claim that there are genuine self-movers, namely, most animals – other than immobile exceptions such as sea squirts (τήθυα, ascidians) and a species of sea anemone; see, for example, *Historia Animalium* iv 6.531a8-35 – with passages in which he seems to deny that there are self-movers or, more radically, that genuine self-motion is possible. As Furley 1978 puts it:

> Aristotle sometimes calls animals self-movers. We must try to determine what exactly he means by this. In particular, we must look at this thesis in the light of certain passages in the Physics that appear to deny that there can be self-movers. Is this apparent anomaly to be explained genetically? Are we to believe that Aristotle criticized and rejected his earlier thesis that animals are self-movers? Or is his position as a whole consistent? How then are we to explain away the apparent anomaly?

Besides the countless passages throughout Aristotle's vast biological works where we find descriptions of animals running, flying, slithering, swimming, and crawling without external impetus, we find, for example, passages conceding, "it sometimes happens that we produce a beginning of motion in ourselves from within ourselves, without anything having set us in motion from without" (*Physics* viii 2.252b19-21). Nothing like this is seen in anything other than animals; "the animal, on the other hand, we say, moves itself" (viii 2.252b23). Later on in *Physics* viii, Aristotle claims that animals are "things that derive their motion from themselves" (viii 4.254b11-12). He does not merely endorse self-motion; rather, he gives great importance to it: "it is the self-mover that we declare to be the principle of things that are moved and impart motion and the primary source for things that are in motion" (viii 7.261a24-26); and, in the opening clauses of *De Motu Animalium*: "the origin of other movements is that which moves itself" (1.698a9-10).

Yet Aristotle also writes that in self-movers, "we observe that there is always some part of the animal's organism in motion, and the cause of the motion of this part is not the animal itself, but, it may be, its environment" (*Physics* viii 2.253a11-13). Further, he argues in both *Physics* viii 2 and viii 6 that animals move themselves only with respect to locomotion and, even with respect to self-locomotion, "this is not strictly originated by them" (viii 6.259b7). For the causes and necessary conditions come – at least in large part –from things outside the animal's control, including processes of respiration, digestion, and various external, environmental factors (viii 2.253a13-18, viii 6.259b8-14). So even in the senses in, and at the times when animals do engage in what is accurately called self-locomotion, they do not do so continuously or with total autonomy. Rather, "it is something else that moves them, itself being in motion and changing as it comes into relation with each several thing that moves itself" (*Physics* viii 6.259b15-17). Moreover, the real self-mover in the animal –

remaining unidentified in *Physics* viii, but it must be the soul, as most commentators assume, due to overwhelming evidence from *De Anima* – is self-moved only accidentally, by moving the body and then being moved as a result of the body's motion (viii 6.259b17-20).

So, despite the passages in which he seems to say that animals are not really self-movers, are animals genuinely capable of self-motion, on Aristotle's account? By looking at a small sample of this tension in *Physics* vii 1-2 wherein Aristotle seems to reject self-motion in vii 1 and then endorse it in vii 2, and by reading vii 1's argument the way I suggest, it is easier to see why Aristotle does not think he is being evasive or contradicting himself on self-motion in *Physics* viii. He certainly could have made his thinking on this subject more systematic and explicit, but it seems to me neither philosophically implausible nor a departure from the texts to understand Aristotle as appropriately qualifying self-motion where we might otherwise be tempted to read him as rejecting it. Aiming to hold onto the ordinary appearance and common view that animals do in fact move themselves, Aristotle also aims to add the qualifications to self-motion that reflect the incoherence of motion beginning from absolutely nothing except the moving object itself (and the philosophical reasons for that incoherence), along with the empirical evidence that seems to show that even the self-locomotion of animals is dependent on various internal and external factors.

V. CONCLUSION

I have argued that in the *Physics* vii 1.α241b35-242a49 / β241b25-242a15, Aristotle does not argue against self-motion altogether. He argues against unqualified self-motion. He does so by arguing for what he takes to be a necessarily universal qualification on all cases of motion, including all cases of self-motion. I understand the temptation of many commentators to worry that Aristotle contradicts himself in no uncertain terms by going on to endorse self-motion in many clear cases throughout the *Physics* viii (as well as *Physics* vii.2),

De Anima, De Motu Animalium, not to mention frequently throughout the biological works. But it seems to me that other commentators might well have lost sight of just how unreasonable it would be for any competent thinker, let alone one as empirically grounded and common sense-driven as Aristotle, to pretend as though actions, including self-affecting and self-caused actions, can be done without any mitigating qualifications.

I also argued that common criticisms of the argument's vital principle I've labeled as P3 can be successfully met. There are no doubt further objections I have not had space to address here – perhaps most notably: I've not had space to defend P2. But it seems to me that the argument does not deserve its unfortunate reputation and, as I explained in Section 4, reading the argument in the more charitable way I suggest has some useful implications for understanding Aristotelian self-motion.[14]

[14] For helpful comments on earlier drafts of this chapter, I am grateful to Susan Berryman, Mitzi (Mi-Kyoung) Lee, Christopher Taylor, and an anonymous reviewer for *Ancient Philosophy*. Though this chapter was published in *Ancient Philosophy* rather than *Phronesis*, I am grateful to an anonymous reviewer for *Phronesis* for giving helpful comments on a much earlier draft.

CHAPTER 3

ARISTOTLE ON ELEMENTAL MOTION VERSUS SELF-MOTION

Abstract: Aristotle argues (in *Physics* viii 4) that natural elemental motion doesn't count as a kind of self-motion. Even when water, for example, seems to move by itself, it is not moving itself. Here we learn what makes self-motion unique, special, and distinct from other kinds of motion, including other kinds of natural motion. I read Aristotle as giving five philosophically and scientifically interesting reasons for distinguishing between the unforced downward motion of water and the self-motion of which animals (alone) are capable.

I. INTRODUCTION

In Chapter One, I argued (based on a close reading of the stretches of text that open Aristotle's *Physics* vii) that, for Aristotle, all motion including all self-motion is qualified in at least one basic way: the motion of the whole mobile is dependent on the motion of its proper parts. Construe that dependency-relation as soul-depends-on-body or as body-depends-on-legs or in some other way or, as I recommend and as the text says, leave all such Aristotelian possibilities open. The point is that Aristotle clearly rejects the unqualified notion of Platonic self-motion in at least one basic way. But as I discussed in Chapter One, Aristotle sees no reason to throw out self-motion with Platonic self-motion. We find a nice example of this strategy in *Physics* vii, as I explained: immediately after seeming to argue in *Physics* vii 1 that self-motion (at least in the unqualified sense) is impossible, Aristotle appears to take for granted in *Physics* vii 2 the possibility of self-motion and the existence of self-movers. Throughout my dissertation, as I continue to study Aristotle's account of self-motion especially in non-human animals, I'll aim to bring out other more significant (physical and psychological) senses in which Aristotle qualifies his account of self-motion

while firmly preserving the intuition that things such as animals are capable of moving in a way that is much more autonomous and self-directed than the motion of which other things are capable. Self-motion is possible, for Aristotle. That's important. He's quite emphatic on that point, as we'll see more and more throughout the rest of my dissertation. But self-motion (including self-motion in animals) is, nonetheless, importantly qualified in many interesting physical and psychological senses.

Of course, that self-motion is qualified by a dependency-relation of whole-to-parts in the way that all cases of motion are qualified, and the fact that in self-movers the mover and moved must be in contact in at least one sense, does not tell us anything about why Aristotle is convinced that there are self-movers. What is animal self-motion for Aristotle? Why doesn't he throw out self-motion with Platonic self-motion? Here in Chapter Two, by studying Aristotle's distinctions in his *Physics* viii 4 between natural elemental motion and animal self-motion, we'll get clear on some of Aristotle's reasons for thinking that self-motion really does exist. This chapter is, then, less about how Aristotle qualifies self-motion, more about how Aristotle supports the claim that there really are self-movers. This helps us understand what, precisely, animal self-motion is, for Aristotle. By paying attention to these distinctions, we get clearer on why animal motion is independent enough to be called 'self-motion'. In addition, we see that in Aristotle's two separate and starkly different defenses of the thesis 'Everything in motion must be moved by something' (the first of which I analyzed in Chapter One and the second I analyze here in Chapter Two), there is a nice illustration the compatibilism between dependency and independency in Aristotle's account of animal self-motion. In Chapter One we saw Aristotle arguing for a kind of basic and highly abstract sense of dependency of self-motion (and all motion), and in Chapter Two we will see Aristotle arguing primarily for important ways in which self-motion is independent.

II. SELF-MOTION VS. ELEMENTAL MOTION

Over two thousand years before thermodynamics, before it was understood why hot air rises, before Newton, and before any proper understanding of a gravitational constant and its relation to the mass of the given objects, how does one explain why water and earth seem to move downward, and why air and fire seem to move upward? Why not posit that the elements *move themselves*? Here I'll examine Aristotle's distinctions between elemental motion and self-motion, shedding light on how Aristotle tries to show that despite the appearance that the elements move by themselves, the elements do not, and cannot, move themselves.

Elemental motion such as the upward motion of fire is a paradigmatic case, for Aristotle, of natural change or motion. Some context is in order here. What, exactly, is natural motion, for Aristotle? His *Physics* II opens by stating that of the things that exist (τῶν ὄντων), some things (τὰ μέν) exist by nature (φύσει) whereas other things (τὰ δὲ) exist from other causes (δί ἄλλας αἰτίας) (*Phys.* II.1.192b9).[15] The natural things include animals and their parts, plants, and the elements or simple bodies (earth, air, fire, and water) (192b10-11). The things that exist by other causes include man-made objects such as beds and cloaks. The natural things differ from the non-natural things not just in being said to exist by nature but also by being constituted by nature and by each individual natural thing (ἕκαστον) having within itself (ἐν ἑαυτῷ) a principle (ἀρχὴν) of motion and of stationariness (κινήσεως καὶ στάσεως) in respect of place (κατὰ τόπον), or of growth and decrease (κατ' αὔξησιν καὶ φθίσιν), or by way of alteration (κατ' ἀλλοίωσιν) (192b14-15). Beds and cloaks and other human-made things, insofar as they are products of art (ἀπὸ τέχνης) have no such innate

[15] Greek text is taken from the OCT, Ross (1950). English translations are taken from Hardie and Gaye's translation of the *Physics* in the Barnes Collected Works (1984).

impulse to change (192b16-17). Man-made objects are capable of natural change only insofar as they happen to be composed of some natural thing such as stone or earth or a mixture of the two (192b18-20). Aristotle says that this indicates that nature is a principle (ἀρχῆς) or cause (αἰτίας) of being moved (τοῦ κινεῖσθαι) and of being at rest (καὶ ἠρεμεῖν) in that to which it belongs primarily (ἐν ᾧ ὑπάρχει πρώτως), in virtue of itself and not accidentally (192b21-23). So, for Aristotle, all and only the simple bodies, plants, animals and animals' parts are capable of changing naturally. They can change naturally in place, in quantity, and in quality. Plant growth, reproduction, phototropism (bending toward the sun), metabolism, and other such changes are natural. The upward motion of the light elements (fire and air) and the downward motion of the heavy elements (earth and water) is also natural. So, too, growth, reproduction, metabolism, feeding, and other changes in animals are natural.

In *Physics* viii 4, while defending the thesis that everything in motion must be moved by something not the same as the very thing in motion (a thesis he has already defended through much more abstract means, as we saw in detail in Chapter One) Aristotle returns to the subject of the natural motion of the elements.[16] He says that the upward motion of the light and the downward motion of the heavy pose the greatest difficulty (μάλιστα δ' ἀπορεῖται) for that thesis (*Phys.* viii 4.254b33). It's easy to see that things moved contrary to nature must be moved by something else. When a stone is thrown upward, for example, it's obvious that the thrower moves the stone. Even in cases of self-motion, when an animal moves toward a perceived source of food or flees from a predator, Aristotle says it's comparatively easy to tell that the animal must be moved by something else. For there is

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[16] The first argument for this thesis is in *Physics* vii 1.α241b35-242a49, β241b25-242a15.

always an active part and a passive part functioning together so as to allow the animal to engage in self-motion: "just as in ships and things not naturally constituted, that which causes motion [τὸ κινοῦν] is separate from that which suffers motion [τὸ κινούμενον], and in this way the animal as a whole causes its own motion [καὶ οὕτω τὸ ἅπαν αὐτὸ αὑτὸ κινεῖν]" (*Phys*. VIII 4.254b30-32).[17] But when it comes to the natural motion of the elements "it is no longer evident [οὐκέτι φανερόν], as it is when the motion is unnatural, whence their motion is derived" (*Phys*. VIII 4.255a5-6). There is no clearly apparent external agent in the case of naturally moving elements. Seemingly, water (for example) moves downward by itself. What, then, moves water downward, other than water itself?

More precisely, for Aristotle, fire has no weight (*De Caelo* iv 4.311b28).[18] So fire is absolutely light and moves upward or to the extremity (iv 1.308a29-30). Earth, on the other end of the spectrum, has no lightness (iv 4.311b28). So earth is absolutely heavy and moves downward or to the center – the center of the Earth (which for Aristotle also happens to be the center of the entire universe) (iv 1.308a30-31, cf. ii 14.296b7-24). As for air and water, "neither of them is absolutely either light or heavy" (311a24-25). Both air and water are lighter than earth (since any portion of either air or water rises to the surface of earth), and both are heavier than fire (since a portion of either, whatever its quantity, sinks to the bottom of fire) (311a24-27). But water is still lighter than everything except earth, and so

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[17] As Bostock (1996: 289) and others have noted, Aristotle's *Physics* viii never sheds any light on which specific part of the animal is the one that causes motion, and which specific part is the one that suffers motion, as the explanation of self-motion in animals. Aristotle's position in viii is that it's obvious that there is an active part (the transitive mover) and a passive part (the intransitive mover) cause self-motion in animals capable of self-motion. Commentators since antiquity assume that Aristotle means the soul as the active part and the body as the passive part. I suspect this assumption is correct from Aristotle's account of self-motion in *De Motu Animalium* and *De Anima* iii 9-10, but it certainly would have been helpful if Aristotle had been more explicit on the matter. For more on Aristotle's account of animal self-motion, see Berryman (2002), Corcilius and Gregoric (2013), Freeland (1994), Furley (1978), Gill (1991), Meyer (1994), Morison (2004), and Waterlow (1982: 204-261).

[18] That's why it is not the case, for Aristotle, that all bodies have weight (*De Caelo* iv 4.311b19).

water naturally moves to downward to the bottom of all things except earth. Conversely, since air is lighter than everything except fire, air by nature moves upward to the top of everything except fire. So by nature "water sinks to the bottom of all things except earth, while air rises to the surface of all things except fire" (312a26-27). Since, then, "fire, in whatever quantity, so long as there is no external obstacle, moves upward, and earth downward; and if the quantity is increased, the movement is the same, though swifter", it seems that the elements naturally move by themselves. It seems, then, that nothing other than fire moves fire when fire naturally moves upward; mutatis mutandis for the natural motion of earth, water, and air. So we seem to have clear counterexamples to *Physics* VIII 4's main thesis, namely, "Everything in motion must be moved by something (else)".

Aristotle struggles in *Physics* viii 4 to show why natural elemental motion does not really count as a counterexample to the thesis that everything in motion must be moved by something else. Commentators agree *that* the conclusion of Aristotle's argument (*Phys*. viii 4.255a18-256a3) is that elemental motion is caused by either whatever generated them and caused them to be light or heavy in the first place (for example, whatever it is that turns water into air) and/or by whatever removed the obstacle or impediment to their natural upward or downward motion – see Bodnar (1997: 109), Bostock (1996: lxiii-lxvi), Cohen (1996: 33-54), Gill (1989: 238), Graham (1999: 74-89), Guthrie (1939: xxxii-xxxiii), Judson (1994: 158-159), Katayama (2011: 163-190), Lang (1984: 69-106), Meyer (1994: 77), Solmsen (1960: 254, 269), and Waterlow (1982: 167-168). But commentators do not agree about *why* that is Aristotle's conclusion, and, especially, about how to make sense of Aristotle's argument for that conclusion. For example, David Bostock argues that Aristotle "fails to consider the suggestion that there might be some other way in which [the elements] could be said to 'move themselves'" (1996: lxiii). Sarah Waterlow Broadie argues that on the

distinction between natural motion and self-motion Aristotle is more elusive and obscure than on any other subject in the *Physics* (1982: 204). Waterlow argues that for Aristotle, nature is a self-mover, and, therefore, there is a significant problem between *Physics* ii 1 (Aristotle's definition of nature and description of the natural things, explained at the start of this paper) and Aristotle's argument in *Physics* VIII 4 for the claim that everything in motion must be moved by something else (1982: 193, 240, 204-257). Sheldon Cohen asks how a motion caused by something external can be natural (*Physics* viii) if to be natural is to have "an internal principle for natural motions" (1994: 152-153). William Charlton argues that "despite Aristotle's general protestations" in *Physics* viii 4, for Aristotle the elements are in fact self-movers (1991, cf. 1987: 277-289). John Rist argues that for Aristotle natural motion is "apparently" self-motion, and since the elements are for Aristotle natural things, they also count as living things (1989: 123-124, 130, cf. 204).

I'll give a reading on which Aristotle has five main reasons for holding that elemental motion cannot count as self-motion: (1) the elements aren't alive, (2) they can't stop their natural motion on their own, (3) they can't naturally move in a contrary direction, (4) they can't naturally move in more than two ways, and (5) they are continuous and naturally unified. I'll argue that (1)-(5) are consistent with Aristotle's related commitments in natural science, not implausible by contemporary philosophical or scientific standards, and can help us get clearer on what it means for something to be capable of moving itself.

2.1 – First distinction: self-movers must be alive

Aristotle's first reason that elemental motion can't count as self-motion is that "this is a characteristic of life and peculiar [ἴδιον] to living things [τῶν ἐμψύχων]" (*Phys.* viii 4.255a7). Only plants and (human and non-human) animals have souls, on Aristotle's account in his *De Anima*, that give them capacities to grow and reproduce. In the case of

animals, their souls give them not just growth and reproductive capacities but it also allows them to sense, desire, form internal images of external objects, and move from one place to another. In the case of human beings, our souls give us all of these capacities and also the capacity to reason, to recall the past at will, to exercise self-control, and to engage in decision-making (*prohaireseis*). The elements have a nature, an internal principle of change and motion, rest and stability. But they have no soul; they cannot grow, reproduce, desire, imagine, or reason. They are not alive.

Is it reasonable for Aristotle to argue that only living things are capable of moving themselves? In the case of non-natural things such as hats and coats, it certainly seems like an accurate generalization. But natural, non-living things such as the elements seem like more reasonable candidates for the self-mover ascription. Still, Aristotle might distinguish between the appearance of *changing by itself* and the more demanding ascription *changing itself*. Though water, for example, appears to naturally move downward without anything forcing it downward and thus appears to *change by itself*, Aristotle might still maintain that without any principle of life or soul and thus without any purpose to its motion other than moving downward, the water's natural motion is too simple and predictable to be called self-change.

Moreover, consider that contemporary biologists tend to agree that conditions such as homeostasis (regulation of internal environment), organization (being composed of at least one cell), metabolism (transforms energy through anabolism and catabolism), growth (maintaining more anabolism than catabolism, increasing in size throughout each part of the organism rather than just adding matter to the whole), adaptation (changing to respond to factors in the given environment), stimuli-response, and reproduction are traits that all or most living things exhibit (McKay 2004; Koshland 2002; Trifonov 2012). Contemporary biology seems to agree with at least one part of Aristotle's argument, then: the elements are

not alive, since they do not grow, reproduce, adapt or metabolize. But in particular, the stimuli-response trait is often expressed through motion, such as phototropism in plants. The elements interact with each other, such as the movement of much of the water in oceans being caused by swirling winds above. So in some loose sense, the elements do seem to respond to stimuli. They do not, however, respond to stimuli in any way that aids growth, reproduction, adaptation or metabolism; this is for the simple reason that they are incapable of any such activities. Aristotle is well aware that even the most basic types of animals are capable of responding to stimuli in ways that non-living things are not:

Some testaceans also are capable of motion, like the scallop, and indeed some aver that scallops can actually fly, owing to the circumstance that they often jump right out of the apparatus by means of which they are caught (*HA* IV 4.527a30-32).

All the spiral-shaped testaceans can move and creep, and even the limpet relaxes its hold to go in quest of food. …Limpets also detach themselves, and shift from place to place (*HA* IV 5.528a35-b1, V 16.548a26-27).

Though water seems to move downward without being forced or carried downward by anything else, water does not avoid moving to an area of intense heat and prolonged sunlight so as to avoid being turned into air. It simply moves downward wherever and whenever it is not impeded from doing so, until (for Aristotle) it rests on top of earth (since earth is heavier than water) at the center of the Earth (which also happens to be the center of the universe, for Aristotle). Even plants, Aristotle observes, "send their roots down (not up) for the sake of nourishment" (*Phys.* ii 8.199a27-28). In that sense, growth in plants does seem directed at a specific goal, namely, nourishment and continued growth.[19] That seems to lend natural

[19] Aristotle notes that plants are capable of not just increase (growth) and decrease (decay), but also reproduction and some qualitative changes such as leaves changing color, and producing seed and fruit: "For the food which plants absorb from the ground is already concocted, and they give off instead their seeds and fruits" (*Parts of Animals* ii 10.655b34-35).[19] Elsewhere, Aristotle observes, "even in plants we find in the same kind some trees which bear fruit and others which, while bearing none themselves, yet contribute to the ripening of the fruits of those which do, as in the case of the fig-tree and caprifig" (*Generation of Animals* i

change some autonomy that is missing from elemental motion. So, even without being aware of relevant factors such as basic principles of thermodynamics (explaining why hot air rises), the role of gravity (such as through earth's gravitational constant) pulling an object relative to its mass, it still seems reasonable not just by Aristotle's own standards but by more contemporary, biological standards for Aristotle to use the fact that the elements are not alive to argue that elemental motion cannot count as self-motion. The fact that air is not alive seems like a good reason to think that even if air appears to move upward by itself, this does not entail that air is properly speaking capable of self-motion and moves itself upward.

2.2 – Second distinction: the elements cannot stop their own motion

Aristotle argues that if the elements were capable of moving themselves then "it would have been in their power to stop themselves (I mean that if e.g. a thing can cause itself to walk it can also cause itself not to walk)" (*Phys*. viii 4.255a7-8). But the elements do not have the power to stop their own natural motion. That is, according to Aristotle, earth stops moving downward if and only if: either it has already reached the center of the Earth (and the center of the universe) or some other object is impeding it. Without either of those latter conditions satisfied, earth will always move continuously downward. So, Aristotle infers, elemental motion cannot count as self-motion.

Though Aristotle does not state the following as support for his view, he might well have helped himself to a description of the movement of most non-natural objects. If a shoe is dropped, it moves downward toward the ground. If there is a hole in precisely the part of the ground where the shoe falls, the shoe will presumably fall into the lowest part of that

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1.715b21 -24). Aristotle goes on to argue that some plants "come into being from seed and others, as it were, by the spontaneous action of nature, arising either from decomposition of the earth or of some parts in other plants; for some are not formed by themselves separately but are produced upon other trees, as the mistletoe" (*Generation of Animals* i 1.715b25-716a1). It seems, then, that the activities and processes in which plants engage cannot be so neatly grouped into just a single kind, whereas the natural motion of the simple bodies quite clearly can be grouped in such a way – upward motion of air and fire, and downward motion of earth and water.

hole. When the shoe is dropped and moves downward, nothing appears to move the shoe downward. Of course, Aristotle would point out that there must have been some power that caused the shoe to fall in the first place, whether that power was animate or not, natural or not, rational or not. As a man-made, non-natural object, Aristotle holds that the shoe has "no innate impulse to change" (*Phys.* ii 1.192b17). The elements, in contrast, are natural, and therefore have an internal principle of change and stability, motion and rest. But the downward motion of earth and the downward motion of the shoe do not seem to have any obvious differences: earth will move downward in just the same way as the shoe (perhaps a little faster if the earth is heavier and/or a larger quantity), and will only move up if forced to move up. Aristotle might well maintain, then, that the shoe has no more of an ability to stop its downward motion than earth does. So if non-natural objects' falling (unless held up or impeded) doesn't count as self-motion, then nor by this condition should the downward motion of earth (nor the downward motion of water, the upward motion of air, and the upward motion of fire). None of these things are capable of stopping their own motion; either they are stopped, or they continue moving as far as they can go in their natural direction.

Aristotle's self-stopping-condition for self-motion also seems fairly reasonable by contemporary lights, even though we hold something like his conclusion for markedly different reasons. Whereas Aristotle holds that objects move up or down due to their weight, that is, being light or heavy (and, since fire is absolutely weightless, it always moves up to the uppermost position unless impeded), we understand now that an object's weight varies depending on the gravitational acceleration it is undergoing. Mass is what remains fixed, not weight. Instead, weight just is equal to an object's mass multiplied by the gravitational acceleration constant. This is why a clump of earth dropped to the ground falls at the rate it

falls and in the direction it falls (relative to its mass, the force with which, the position from which it was dropped, the presence of wind, and so on). Fire or any other object might be weightless in certain contexts, but that would be so because the object is in free fall, that is, its acceleration is identical to the gravitational acceleration. Thanks to thermodynamics, we also understand that hot air rises because heated air (like any other gas) expands, causing it to become less dense than the surrounding air. As wind floats on water, air with less density (hot air) floats on the denser air (cold air). Though Aristotle was incorrect in these areas, by our lights he is still in an important sense correct to think that the forces responsible for elemental motion are not in the stopping-power of the elements themselves. The elements interact with one another and other natural and non-natural objects, and are in some ways and in some spatiotemporal locations moved by us. But other than that, using thermodynamics, gravity, mass, related principles, and a perfectly accurate and exhaustive account of the physics involved, we could presumably predict with total accuracy exactly how and when the elements move. Whereas a human being can choose to stop rolling down a hill, the elements do not offer any resistance to the physical principles (gravity, thermodynamics, etc.) that direct elemental motion. It sounds odd by both Aristotle's lights and contemporary lights to say that the elements move themselves. And, in a sense, it is *not correct* (though it might sound pleasingly simple) to say that there is this convergence for *different reasons*. After all, Aristotle's self-stopping condition for self-motion seems plausible by our standards too. Rather, the more specific reasons for holding that elemental motion does not satisfy the self-stopping condition are what mark the most relevant difference between Aristotle's argument and the modern argument.[20]

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[20] It might seem that the claim that the elements cannot stop their own motion requires a controversial assumption about the nature of an element and how this fits into Aristotle's general definition of nature. Gill (1989) seems to argue that the nature of an element is a principle of motion (but not a principle of rest). In

2.3 – Third distinction: the elements cannot naturally move in a contrary direction

Aristotle argues that if the natural motion of the elements were to count as self-motion, then the elements ought to be able to naturally move (move themselves) in the opposite direction. For example, "since on this supposition fire itself possesses the power of upward locomotion [εἰ ἐπ' αὐτῷ τὸ ἄνω φέρεσθαι τῷ πυρί], it is clear that it should also possess the power of downward locomotion [δῆλον ὅτι ἐπ' αὐτῷ καὶ τὸ κάτω]" (*Phys*. viii 4.255a8-9). Aristotle seems to have in mind a distinction he states in his Metaphysics between potentialities: "And each of those which are accompanied by reason is alike capable of contrary effects, but one non-rational power produces one effect; e.g. the hot is capable only of heating, but the medical art can produce both disease and health" (*Metaph*. Θ 2.1046b5-7). Most commentators tend to collapse the stopping condition with this contrary motion condition, but it's clear that stopping one's motion is different from moving in the contrary way or direction. I am a self-mover in part because when I am walking due east I can abruptly change at any time I like (duties, impediments, traffic, etc. aside) to walking due west. Were I to be capable merely of stopping my motion but apparently incapable of moving in the opposite direction, it would seem that my motion is not in my control to the extent required of self-motion. If water were capable of either moving downward or

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contrast, Cohen (1994: 156-157) argues that the nature of an element is a principle of rest**.** The core of Cohen's argument for this claim is that the elements, for Aristotle, move naturally upward or downward not for the sake of moving forever but, rather, for the sake of coming to rest at their natural position (either at or near the center of the earth and universe, or else at their uppermost positions at the 'top' of the universe). Bodnar (1997) argues that the nature of an element is a principle of motion and a principle of rest. One might think that I need to favor Gill's interpretation. For if the elements have an internal principle of rest then, it seems, the elements really can stop their own motion once they reach their natural resting place. But it seems to me that my claims here (the elements cannot move themselves, for Aristotle) are compatible with Gill's interpretation, Cohen's interpretation, and Bodnar's interpretation. If Cohen and Bodnar are correct in arguing that the nature of an element includes a principle of rest then it's still false to say that the elements stop their *own* motion. For, the elements cannot choose their own resting place; they have one and only one resting place, and they are completely dependent for their motion and rest on their location relative to the location of that resting place (lowest or uppermost position).

stopping its own motion naturally, this would not seem autonomous enough on its own to count as motion under the control of the water. But if water were capable of both moving downward naturally, stopping its own motion, and moving upward, this would look a good deal more like self-motion.

But this account needs a significant qualification. For Aristotle does not hold an unrealistically strong version of this condition for self-motion. He is very much aware that self-moving animals cannot start and stop their own breathing, digestion, perspiration, need for sleep, need for food, metabolism, and other processes crucially involved in and in many cases required for their self-motion:

> The cause of [animal self-motion] is not derived from the animal itself: there are other natural motions in animals, which they do not experience through their own instrumentality, e.g. increase, decrease, and respiration: these are experienced by every animal while it is at rest and not on motion in respect of the motion set up by its own agency; here the motion is caused by the environment and by many things that enter into the animal: thus in some cases the cause is nourishment – when it is being digested the animals sleep, and when it is being distributed they awake and move themselves, the first principle of this motion being thus originally derived from outside. Therefore animals are not always in continuous motion by their own agency (*Phys*. viii 6.259b7-12).

So, for Aristotle, though self-moving animals are capable of stopping their own motion and also capable of moving in a contrary direction, they are not capable of stopping or otherwise altering many necessary conditions for their self-motion. That something is able to move itself and, in particular, that something is able to move in a contrary direction does not entail, then, that strictly speaking it moves *by* itself.

Aristotle's account seems accurate not just by ancient scientific standards but also, I think, by contemporary standards. In fact, it seems *more* accurate by our standards. For nowadays we know a great deal more about the processes going on inside human and non-human animals, down to the microscopic level (unbeknownst to Aristotle, of course). We know that we are in most senses not in control of any of those processes – except, perhaps,

for the attenuated sense in which we might say that we are capable of ending such processes through choosing not to live any longer. It is difficult to comprehensively understand let alone control all of the processes that make up our metabolism, reproduction, digestion, respiration, and other activities crucial to our survival and self-motion. Aristotle points to factors in the (human or non-human) animal's environment outside the animal's control but vital for determining where the animal can survive, when and where it will move. We know now a great deal more about our environment, both on a more local level (what, for example, causes changes in weather and the climate) and on a more universal level (we know much better than Aristotle did how enormous the universe is, how we are hurtling and rotating round the sun). We know that we have little if any control over most of those environmental factors. We can impact our climate in some ways, of course, but the day-to-day weather seems for most of us – just as it did in the ancient world – a matter that is out of our control. Even if we were to destroy our planet through all-out nuclear war, it seems unlikely that we would make a significant dent in our galaxy, let alone the entire universe. Despite our lack of environmental control, and in general our lack of control over key necessary conditions for our motion and change, we do say that we (and non-human) animals are capable of moving and changing ourselves.

2.4 – Fourth distinction: self-movers must be able to move in multiple ways

Aristotle argues, "if things move themselves [εἴγε αὐτὰ ἑαυτὰ κινοῦσιν], it would be unreasonable to suppose that in only one kind of motion is their motion derived from themselves [ἄλογον δὲ καὶ τὸ μίαν κίνησιν κινεῖσθαι μόνην ὑφ' αὑτῶν]" (*Phys.* viii 4.255a10-12). That a thing is able to move in a direction and the opposite direction seems to entail that it can move in multiple directions – that is, not just one but two directions. So it might be tempting to collapse this multiple-direction condition with the contrary-motion

condition (discussed in the previous section). But on a more context-sensitive reading, I suspect that what Aristotle has in mind is not a weak "at least two ways" version of this condition but, rather, a condition that more closely resembles the impressive diversity observed in the motion of most animals. Aristotle's vast biological works describe animals moving in all sorts of interesting, different ways. He observes, "the bee ever settles on anything rotten, but on things sweet; and the gnat settles only on acid substances, and not on sweet" (*History of Animals* iv 8.535a3-4). He reports, "the bear for a short time can walk erect on its hind legs" (*HA* viii 5.594b14); "the beaver at night-time often emerges from the water and goes nibbling at the bark of the aspens that fringe the riverside" (595a1-2); and "the crane migrates from one end of the world to the other; they fly against the wind" (12.597a31-b1). There are hundreds upon hundreds of other examples from Aristotle's vast extant biological works where he describes animals moving from one environment to another so as to avoid bad weather or so as to find more plentiful sources of food, finding the most suitable materials for a nest, using cunning methods to avoid predators or to catch prey, and so on. And since (human and non-human) animals are self-movers for Aristotle, it seems to me that when he points out the limited directionality of natural elemental motion, Aristotle has in mind an unfavorable comparison with the diverse ways, methods, and directions of animal motion. It's not merely the case, then, that Aristotle is pointing out that the elements naturally move in just one way (upward for fire and air, downward for earth and water). Rather, more interestingly, he seems to be intimating that self-movers ought to be – and, in fact, *are* – capable of movement in a remarkably large number of ways and directions.

2.5 – Fifth distinction: self-movers must have an active part and a passive part

Aristotle asks rhetorically, "How can anything continuous [συνεχές] and naturally unified [συμφυὲς] move itself [αὐτὸ ἑαυτὸ κινεῖν]?" (*Phys*. viii 4.255a12). For, he reasons, "In so far as [ᾗ] a thing is one and continuous not merely in virtue of contact [μὴ ἁφῇ], it is impassive [ἀπαθές]: it is only in so far as a thing is divided [ᾗ κεχώρισται] that one part of it [τὸ μὲν] is by nature active [ποιεῖν] and another [τὸ δὲ] passive [πάσχειν]" (255a13-15). This distinction echoes what Aristotle stated only a few lines earlier about the structure of self-moving animals: "It would seem that in animals, just as in ships and things not naturally constituted, that which causes motion is separate from that which suffers motion, and that in this way the animal as a whole causes its own motion" (254b29-31). In order to be capable of moving itself, a thing must be divisible into a part that moves (in the transitive sense), that is, an active part, and a part that is moved, that is, a passive part. Earth, air, fire, and water do not have souls; so, they do not have a soul-part in contrast with their physical part. Nor do the elements have distinguishable physical parts: any given body of water, for example, is continuous throughout. So, Aristotle infers, the elements cannot be self-movers.

I explained in the previous section that Aristotle is perfectly comfortable conceding that self-moving animals are not in control of many internal factors (such as respiration and metabolism) and external factors (such as environmental conditions and the presence of an adequate food source) vital for whether and when they can move. But this continuity condition for self-motion is more abstract. Commentators since Simplicius (1208.30-31) have assumed that by the active part Aristotle means the soul, and by the passive part Aristotle means the body. Aristotle does not elucidate the matter anywhere in *Physics* viii. It is only in *De Anima* iii 9-10 that Aristotle explains that the directing faculty for self-motion is desire working together with *phantasia* (something like imagination) and *nous* (reason); his account there seems to be that the faculty of desire is the active, directing, moving part of

the animal's soul in cases of self-motion. Also, he makes it very clear throughout *De Anima* that with respect to all changes rather than just self-locomotion (including growth, reproduction, reasoning, desiring, imagining, and so on), the soul moves the body. The soul moves only coincidentally or accidentally, by moving the body and then being housed inside that body as the body moves. The body is the passive part, the moved. The soul is the active part, the mover.

Nowadays, we understand that there are important senses in which there are not just notionally but *physically* distinct parts within the elements. Though water might appear to be continuous and naturally unified, without distinct parts, we know that a covalent bond inside each water molecule attaches one oxygen atom and two hydrogen atoms. We know that dry air is comprised of 78.09% nitrogen, 20.95% oxygen, 0.93% argon, 0.04% carbon dioxide, with the remainder comprised of small amounts of different gases (Lide 1996). Soil is typically composed of potassium, carbonate, sulfate, nitrate, ammonium, iron oxide, phosphate, urea, and so on (though its composition is much more variable). And we know that fire is the result of combustion, a chemical reaction; after ignition, flames consist mainly of carbon dioxide, water vapor, oxygen, and nitrogen. In a sense, then, it seems that Aristotle got this wrong: the elements do have parts. Still, it seems to me that in a more important sense, Aristotle's argument is still fairly plausible by contemporary standards. For despite the fact that the elements do have parts, they do not have the *kinds* of parts that animals have; besides lacking a soul, the elements also obviously lack a brain, a central nervous system, any means of sensation, and so on. They do not have the kinds of parts that can create the active-passive interplay that Aristotle requires of self-movers. Even plants have parts capable of playing an active role, such as plants' leaves that capture sunlight, the roots that absorb water and minerals from the soil, and the stems that conduct water and nutrients. But I'll

discuss this in much more detail in Chapter Three, where I'll apply Aristotle's distinctions between elemental motion and animal self-motion to the unexplored problem of whether growth and metabolism in plants can count as kinds of self-change.

CHAPTER 4

ARISTOTLE ON SELF-CHANGE IN PLANTS

Abstract: A lot of scholarly attention has been given to Aristotle's account of how and why animals are capable of moving themselves. But no one has focused on the question, whether self-change is possible in plants, on Aristotle's account. I first give some context and explain why this topic is worth exploring. I then turn to Aristotle's conditions for self-change given in *Physics* viii 4 (examined in Chapter Two), where he argues that the natural motion of the elements does not count as self-motion. Here I apply those conditions to natural change in plants. Then I explore the reasons for and consequences of Aristotle's arguing that plants are incapable of sensation. I argue that for Aristotle plants cannot possess the directing faculties for self-change, namely, desire and *phantasia*. My goal is to go some of the way toward showing why, for Aristotle, growth, metabolism, and reproduction in plants would not count as self-change, despite many of these natural changes appearing as autonomous as the analogous changes in animals. This sheds light on how, for Aristotle, self-change differs from natural change.

I. INTRODUCTION

We saw in Chapter Two that Aristotle carefully distinguishes between natural elemental motion (such as the unimpeded downward motion of water) and the self-motion of which animals are capable. This gives us a clear picture of how self-motion is different from some other kinds of natural change. But there are other natural things besides the elements. In fact, there are other living things besides animals, as Aristotle is well aware. There are plants. Plants seem to take in nutrition, grow, change color, bend toward the sun, and do other marvelous things without being forced to do so by anything else. They seem to do these things by themselves. Like elemental motion, then, we might well wonder why

plants do not change themselves. Why aren't plants self-changers? Though Theophrastus, Aristotle's friend and colleague, took charge of botany whereas Aristotle devoted his attention to biology, Aristotle sometimes shows a keen awareness of growth and metabolism in plants. Yet Aristotle has no discussion of whether or not plants capable of self-change. This is probably why no one has yet attempted to reconstruct his views on the matter. That's my task here. Doing so will, I hope, shed further light on what makes animal self-motion unique, especially as a species of natural change. In particular, by applying Chapter Two's distinctions to the case of growth and metabolism in plants, we will see that there are interesting and unexplored ways to excavate the dependency-independency compatibilism in Aristotle's account of animal self-motion. That is, applying *Physics* viii 4's self-motion conditions to the plant-change vs. animal-motion distinction brings out not just ways in which animal self-motion is more self-directed and independent than growth and metabolism in plants, but also some crucial ways in which animal self-motion is as dependent (on things outside the animal's control) as is growth and metabolism in plants. This discussion will, then, shed light not just on what makes self-motion unique, and what animal self-motion is, but also on ways in which self-motion is no less causally reliant than many other kinds of change.

Aristotle's account of animal self-change has been the subject of a lot of scholarly attention. But no one has asked the question, whether plants (τὰ φυτὰ) are capable of self-change, on Aristotle's account. For example, consider Furley's (1978: 1) helpful warning about an incautious reading that fails to distinguish between natural motion and self-motion:

> To anyone who reads *Phys*. II a little incautiously it might appear that since nature is declared to be an internal source of change and rest (1.[193b13-33]), anything that has a nature must be a self-mover. For what is a self-mover but a thing that has *in itself* a source of change and rest? Thus all the things specified at the beginning of *Phys*. II 1 would be self-movers: living things and their parts, plants, and the simple bodies, earth, water, air, and fire.

Furley goes on to explain why Aristotle rules out the elements' natural motion as self-motion. Also, Furley explores in detail why Aristotle qualifies animal self-motion in several important ways while firmly ascribing self-motion to animals. But Furley does not discuss plants, the only remaining group of natural things included in Aristotle's list in the *Phys*. II passage that Furley emphasizes above. But it seems worth exploring why (if at all) plants' natural change would not count as self-change for Aristotle so as to get clearer on how, precisely, self-change differs from natural change. I'll say a bit more about why this topic is worth exploring (Section 2). Then I will apply Aristotle's conditions for self-change given in *Phys*. VIII 4 to natural changes in plants. My goal is to go some of the way toward showing why, for Aristotle, growth, metabolism, and reproduction in plants would not count as self-change, despite many of these processes appearing as autonomous as the analogous processes in animals (Section 3). Finally, I'll explore the reasons for and consequences of Aristotle's arguing that plants are incapable of sensation. This suggests, I argue, that plants cannot possess the directing faculties for self-change, namely, desire and *phantasia* (Section 4). The broader aim of this inquiry is to shed additional light on Aristotle's distinctions between natural change and self-change, helping us to get clearer on what animal self-motion is, for Aristotle.

II. OTHER REASONS TO EXPLORE THE POSSIBILITY OF SELF-CHANGE IN PLANTS

Despite a good deal of scholarly attention devoted to Aristotle's account of self-change in animals, including some attention given to Aristotle's distinction between the natural motion of the elements and the self-change of animals, no one has yet focused on the distinction between natural change in plants (such as growth, metabolism, reproduction) and self-change in animals. Besides generally helping us to get clearer on how self-change

differs from natural change for Aristotle, here I'll say a bit more about why this topic is worth exploring.

First, a straightforward, text-focused point: whereas there is only *one* passage in all of Plato's extant writings in which plants are given anything close to serious attention (*Timaeus* 77a-c), Aristotle discusses plants quite carefully in many passages in several works such as *De Generatione Animalium* ('On the Generation of animals', Περὶ ζῴων γενέσεως)[21] and, more saliently, in *De Anima* and in the *Physics*. For it is in these latter works that self-change is discussed in the most detail).[22] In his *Parva Naturalium* ('Short treatises on nature') there are quite a few passages in which plants are mentioned and briefly discussed.[23] So Aristotle is by no means averse to discussing plants, including in his works that have sections examining self-change. The texts, then, seem to warrant an inquiry into Aristotle's account of the capacities of plants, and self-change seems like an interesting candidate.[24]

Second, by getting clear on whether or not for Aristotle plants are capable of self-change, we can shed light not just on his distinction between natural change and self-change

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[21] See passages such as 715b18-16a1, 717a22, 718b9, 14, 722a11, 723b10-18, 724b10-25b26, 729a4, 731a1-32a12, 733b24-34a35, 735a16, 19, 736a34, b13, 738a4, 740a1-41b35, 749b27, 750a30, 752a19, 753b26, 28, 755b9, 757b19-27, 759b30, 761a16-62b18, 763b24, 771b13, 774b26, 778b35-779a3, 783b10-84a17, and 786a5.

[22] The work 'On Plants' is included in the *Collected Works of Aristotle* in Barnes (1984). But it is double-asterisked, meaning that it is generally agreed that it isn't Aristotle's work.

[23] See 442b26, 454a17, b27, 31, 466a9, 467a6, 12, 22, b2, 24, 468a8, 30, b6, 17, 470a20, 477a28, 478b27, and 479b3.

[24] It should be noted, though, that from Aristotle's student and colleague, Theophrastus, we have 'Enquiry into Plants' (Περὶ φυτῶν ἱστορία) and 'On the Causes of Plants' (Περὶ φυτῶν αἰτιῶν). These botanical works put to shame anything we have from Aristotle on plants. Theophrastus isn't just interested in recording facts about plants. His project is systematic, scientific, and at times philosophical. For example, he gives descriptions of the crooked willow fig pomegranate with its short stem (I.5.1), the mulberry which comes into leaf late due in part to its having plenty of moisture in its environment (I.9.6), the fig which is better than any other tree at striking roots, and will, more than any other tree, grow by any method of propagation (II.5.6), the oak which bears more things besides its fruit than any other tree (III.7.4), the tree found at Mount Ida, called koloitia, which is shrubby, rare, and branching with many boughs (III.17.3), and the kind of reed (bush-grass) which grows on land, is not erect, and sends out its stem over the ground, like the dog's-tooth grass, and so makes its growth (IV.11.13). These observations are not arranged in an arbitrary way but according to parts and their composition (Book I), propagation (Book II), of wild trees (III), of the trees and plants special to particular districts and positions (IV), wood (V), undershrubs (VI), pot-herbs (VII), cereals and legumes (VIII), and medicinal uses of plants (IX).

but also on Aristotle's distinction between plants and animals. This is trickier than it might at first appear. For Aristotle, plants, like animals, are natural things: "Of things that exist, some exist by nature, some from other causes. By nature the animals and their parts exist, and the plants and the simple bodies (earth, fire, air, water)" (*Physics* II 1.192^{b9-10}). That is, plants have within themselves "a principle of motion and of stationariness (in respect of place, or of growth and decrease, or by way of alteration). On the other hand, a bed or a cloak and anything else of that sort…have no innate impulse to change" (192^{b14-15}, ^{16}, ^{19}). Also, like animals and unlike the elements, plants are alive. That is, plants are soul-having (ἔμψυχος) things, as opposed to soul-lacking, inanimate (ἄψυχος) things such as earth, air, fire, water, and all non-natural objects. And Aristotle repeatedly states in his discussions of self-change that self-change is a capacity had *only* by living things. It does not follow, of course, that plants are self-changers. For it might be the case that all self-changers are living things but not all living things are self-changers. The group of living but non-self-changing things might extend to all and only plants. But it *does* follow that on Aristotle's account it is possible that all plants are in some sense self-changers.

That possibility that plants are in some sense self-changers might well be enhanced by Aristotle's view that plants and animals are not always neatly divided. True, *De Anima* tells us that Aristotle's view in general is that plants have a life force, a soul that gives them vegetative and reproductive capacities, but no sensory (sight, hearing, taste, touch, smell), appetitive (desire this or that and being pulled toward the object of desire), locomotive, or advanced mental (intellective) capacities. Only animals have the latter four capacities. Human beings alone possess thinking or the intellective capacity. But Aristotle says that the way nature proceeds from plants to animals is so fine-grained that it is very difficult to tell where plants end and animals begin:

Nature proceeds little by little from things lifeless to animal life in such a way that it is impossible to determine the exact line of demarcation, nor on which side thereof an intermediate form should lie. Thus, next after lifeless things comes the plant, and of plants one will differ from another as to its amount of apparent vitality; and in word, the whole genus of plants, whilst it is devoid of life as compared with an animal, is endowed with life as compared with other corporeal entities. Indeed, as we just remarked, there is observed in plants a continuous scale of ascent towards the animal. So, in the sea, there are certain objects concerning which one would be at a loss to determine whether they be animal or vegetable. For instance, certain of these objects are fairly rooted, and in several cases perish if detached; thus the pinna is rooted to a particular spot, and razor-shell cannot survive withdrawal from its burrow. Indeed, broadly speaking, the entire genus of testaceans have a resemblance to vegetables, if they be contrasted with such animals as are capable of progression (*HA* VIII.1.588^{b4-17}).

It is not just the case that there exist many similarities between those living things classified as plants and those classified as animals, for Aristotle. It's also the case that there are some living things which Aristotle identifies as plant-like animals. There are many instances where Aristotle talks about "all those creatures which do not move, as the testacea and animals that live by clinging to something else, inasmuch as their nature resembles that of plants" (*Generation of Animals* I.1.715^{b16-18}). What Aristotle means in that passage is there are some animals that, like plants, seem to lack the capacity for locomotion. There are even some animals that, like plants, seem to lack sensation let alone appetite. For example, Aristotle describes sessile (non-moving) animals such as sea-squirts (ascidians) as follows:

The sea squirts (τήθυα, ascidians) as they are called are the most extraordinary of animals. They are the only ones whose body is completely hidden inside the shell, the texture of which is between that of skin and shell, and consequently to the knife it cuts like hard leather. The animal clings to the rocks by its shelly part, and it has two passages some distance apart which are very small indeed and by no means easy to see, by which it takes in and discharges the water, for it has no residue so far as can be seen [just as, of the other shell-fish, some are like the sea-urchin, and others have the so called mecon]. When opened up, we find it has, in the first place, a sinewy membrane inside all round the shelly part; and within this is the actual fleshy part of the ascidian, similar to that of none of the others; though this flesh is similar throughout. This substance is attached at two places to the membrane and the skin obliquely; and where it is at attached, the space at each side is narrower where the flesh extends towards the passages that lead out through the shell – by which the animal takes in and discharges the nourishment and liquid matter, just as if one passage were a mouth and the other the outlet for the residue. One of the passages is wider than the other. Inside, there is a cavity on each side, separated by a small continuous portion;

in one of these the liquid is found. The animal has no other part, neither instrumental nor sensory, nor, as was stated before with reference to the others, has it any part for residue. Some ascidians are pale yellow in color, some red (*HA* IV.6.531^{a8-29}).

Sea squirts lack self-locomotion. More radically, since sensation is much more basic as a capacity than locomotion, Aristotle seems to say here that sea-squirts lack *any* means of sensation. And he goes on to describe sea anemones as resembling plants (ἀλλ' ὁμοία κατὰ τοῦτο τοῖς φυτοῖς ἐστιν) in that they lack residue and at least one of their species is immobile. Since there are such extraordinarily basic, plant-like animals, then would Aristotle say that these plant-animals are capable of self-change? If so, then why aren't plants also capable of self-change?

Now, one might argue that these remarks about plant-like animals are somewhat misleading. For one might think that it is only about stationary animals that one could reasonably ask why they are credited with self-change, whereas plants not.[25] But Aristotle asks this question about mobile animals as well:

It is also necessary to consider what initiates motion in imperfectly developed animals [τῶν ἀτελῶν], those whose sensation is limited to touch and taste [ἁφῇ]; whether or not it is possible for them to have *phantasia* and appetite [ἐπιθυμίαν]. For they appear to have pleasure and pain in them; but if they have these, then it is necessary that they have appetite as well. But how could they have *phantasia* in them? Or rather, just as they are moved indeterminately [κινεῖται ἀορίστως], these things are present in them, but present indeterminately [ἀορίστως δ' ἔνεστιν] (*DA* III 11.433^{b31}-434^{a5}).

This is all that Aristotle has to say on the matter. Aristotle seems to be puzzled by the appearance of the capacity for locomotion in some animals that perceive merely by touch and taste. He also seems to be puzzled by the fact that if these incomplete animals are capable of self-motion then they ought to possess also *phantasia* and desire. The referent of "motion" in this passage is locomotion, since (a) that is the subject of discussion from *De*

[25] Thanks to an anonymous reviewer from *Rhizomata* for raising this helpful objection, and for pointing out the passage from Balme – I use it below.

Anima III 9 through to *DA* III 11, and (b) it would not be puzzling how such creatures suffer qualitative or quantitative changes (for such changes could be explained in plant-like terms). Aristotle has in mind creatures such as the mobile species of sea anemone:

Another species of the sea anemone roams freely abroad. The sea anemone appears to be devoid altogether of excretion, and in this respect it resembles a plant. …Of the sea-anemone there are two species; and of these one species lives in hollows and never loosens its hold upon the rocks, and the other lives on smooth flat reefs, free and detached, and shifts its position from time to time. Limpets also detach themselves, and shift from place to place (*HA* 531^{b7-b9}, 548^{a24-27}).

Aristotle doesn't ascribe any sense of sight, hearing or smell to the sea anemone. But he reports that the sea anemone has sensation. When touched by a human hand, the creature seizes and clings onto that hand. In addition, it has a mouth by which it feeds. But Aristotle is puzzled by this animal's ability to roam freely abroad, seemingly in search of food. Other examples:

Some testaceans also are capable of motion, like the scallop, and indeed some aver that scallops can actually fly, owing to the circumstance that they often jump right out of the apparatus by means of which they are caught (*HA* IV 4.527^{a30-32}).

All the spiral-shaped testaceans can move and creep, and even the limpet relaxes its hold to go in quest of food. …Limpets also detach themselves, and shift from place to place (*HA* IV 5.528^{a35-b1}, V 16.548^{a26-27}).

The urchin uses its spines as feet; for it rests its weight on these, and then by moving them shifts from place to place (*HA* IV 5.531^{a5-6}).

A difficulty may be suggested as to the movements of molluscs, that is, as to where that movement originates; for they have no distinction of left and right. Now observation shows them moving. We must, I think, treat all this class as mutilated, and as moving in the way in which limbed creatures do when one cuts off their legs, or as analogous with the seal and the bat. Both the latter are quadrupeds but misshapen. Now molluscs do move, but move in a manner contrary to nature. They are not moving things, but are moving if regarded as sedentary creatures and creatures attached by growth, sedentary if classed with progressing animals" (*De Incessu* 19.714^{b8-17}).

All of these creatures seem to be incapable of hearing, seeing, and smelling. Like all animals, they have at least some capacity for sensation, e.g., "The sponge actually appears to be endowed with a certain sensibility: as a sign of which it is alleged that the difficulty in

detaching it is increased if the movement is not covertly applied" (*HA* 487^{b9-11}, cf. *HA* 548^{b10-12}). But it's not clear how such animals could possess desire and other capacities apparently possessed by all and only animals, as opposed to plants.

Nonetheless, Aristotle might well hold that there *is* a dividing line between plants and animals but that it is merely difficult to *discern* that line in some unusual cases. These include sea sponges, sea anemones, mussels, clams, scallops, starfish, solens (razor shells), holothurians, sea lungs, ascidians, sea urchins, and oysters, each described in Aristotle's biological works. That is, even basic animals such as mussels, clams, and oysters must possess sensation (though they lack all other forms of sensation, and it's difficult to see how they could possess *phantasia* or desire); but plants cannot possess even that highly rudimentary form of sensation. Balme reads Aristotle that way:

> The 'continuity' (physical, not mathematical – συνέχεια is a succession without gaps) of the scala supports Aristotle's view that the same characters exist at different levels of development in different animals. It does not however mean that there is no boundary between plant and animal or between opposed differentiae; it means only that the boundary is hard to see. The animals that "tend to both sides" of a contrariety cannot be on both sides, either actually or logically; nor can they fall between (1991: 60-61).

Balme goes on to consider the case of the sea sponge: though sensation might be only faintly developed in the sea sponge, sensation is either present or not present in any given creature. If a creature has sensation then it's an animal, but without sensation it's not an animal. I think that this is a plausible interpretation of Aristotle's views on plant-like animals. Everything just is either an animal or not. Nothing is both a plant and an animal. Balme's interpretation of Aristotle's view is, though, compatible with its being exceedingly difficult to establish in specific cases, from an epistemic point of view, which particular creatures are animals as opposed to plants. The metaphysical thesis that there exists no creature that is both a plant and an animal is compatible with the epistemic thesis that there are some cases

in which it takes careful scrutiny to acquire knowledge of whether that creature is an animal or a plant. By getting clear on whether or not for Aristotle plants are capable of self-change, therefore, we can shed light not just on Aristotle's distinction between natural change and self-change but also on Aristotle's distinction between plants and animals.

III. ARISTOTLE'S DISTINCTIONS BETWEEN NATURAL MOTION AND SELF-MOTION APPLIED TO HIS ACCOUNT OF GROWTH, METABOLISM, AND REPRODUCTION IN PLANTS

In defending the thesis that everything that moves must be moved by something, in *Phys*. VIII 4 Aristotle argues, "it is impossible to say that the elements' natural motion is derived from themselves [τό τε γὰρ αὐτὰ ὑφ' αὑτῶν φάναι ἀδύνατον]" (255[a6-7]). Aristotle gives four main reasons to think that the upward motion of fire and air and the downward motion of water and earth cannot count as self-change: the simple bodies are not alive (whereas self-change is a capacity unique to living things), they can't stop their natural motion (whereas self-changers can do so), they can't naturally move in more than one way (whereas self-changers move in multiple ways), and they are continuous and naturally unified (whereas in self-changers there must be multiple parts and, in particular, an active part and a passive part) (255[a7-19]). Aristotle also distinguishes the internal source of natural change in the simple bodies from that of animals: the elements have a source of suffering motion and change rather than an active source that causes motion or change (255[b28-29]). Here I will isolate Aristotle's distinctions and criteria; I'll apply each one to Aristotle's account of growth, metabolism, and reproduction in plants. My goal is to go some of the way toward showing why, for Aristotle, natural change in plants does not count as self-change.

First, consider Aristotle's life-condition for self-change. For Aristotle, plants have souls, and are alive: "We think of plants as living, for they are observed to possess in themselves an originative power through which they increase or decrease…" (*DA* II 2.413[a25-

[26]). In fact, to some "Aristotle is apparently the first philosopher to have invoked a soul in explaining nutrition" (Menn 2002).[26] But on Aristotle's account, plants live in a way that is much more basic than the way in which animals live. Whereas animals have souls that give them capacities for growing, reproducing, perceiving, desiring, moving in place and in some cases (for human beings) reasoning, plants merely grow and reproduce:

Of the capacities of the soul we mentioned, some living things have all of them, as we said, others some of them, and some only one. The capacities we mentioned were for nourishment, perception, desiring, movement with respect to place, and thought. To plants only the nutritive part belongs, whereas to others it belongs together with the perceptual part (*DA* II 3.414^{a29-34}).

It's true that plants, as living, growing, reproducing things seem more like self-changers than the elements do. But "plants evidently live without sharing in perception" and without any of the more advanced capacities (*DA* I 5.410^{b22-23}). Aristotle might well hold that while (a) one of the reasons for denying the ascription "self-change" or "self-motion" to the natural motion of the elements is that the elements are not living whereas self-changers are thought to be living, it does not follow that (b) the comparatively basic life enjoyed by plants satisfies the specific kind of life-condition for self-change. Doubting the inference from (a) to (b) seems reasonable. A living thing that is incapable of seeing, smelling, hearing, touching,

[26] Aristotle reports that Empedocles accounted for the growth in plants, and in particular for plants' roots spreading downwards, through the natural movement of fire. But Aristotle argues that "[Empedocles's] theory of upwards and downwards is wrong; for up and down are not the same for all individuals as for the universe, but the head in animals corresponds to the roots in plants, if we are to identify and distinguish organs by their functions. But in addition to this, what is it that holds fire and earth together when they tend to move in contrary directions? For they will be torn apart, unless there is something to prevent this; but if there is anything of the sort this will be the soul, and the cause of growth and nourishment" (*De Anima* II.4.415b25-416a9). Here Aristotle is crystal clear on the function of a plant's soul: the soul (ἡ ψυχὴ) of a plant is the cause or explanation (τὸ αἴτιον) of its growth (τοῦ αὐξάνεσθαι καὶ τρέφεσθαι). But Aristotle is not entirely dismissive of Empedocles's view and related views, and sees some truth in them while nonetheless insisting that all growth and nourishment is due to the soul rather than to fire: "To some the nature of fire seems by itself to be the cause of nutrition and growth; for it alone of all bodies seems to be nourished and grow of itself. Hence one might suppose that it is the operating principle in both plants and animals. It is in a sense a contributory cause, but not absolutely the cause, which is much more properly the soul; for the growth of fire is without limit, so long as there is something to be burned, but of all things naturally composed there is a limit or proportion of size and growth; this is due to the soul, not to fire, and to the essential formula rather than to the matter" (*De Anima* II.4.416a10-18).

tasting, desiring, and/or moving as a whole from one place to another does not seem to share in the kind of life that is autonomous and complex enough to be capable of what we or Aristotle would call self-change. A living thing might grow and reproduce without being capable of self-change. But I'll say much more about this in my examination of Aristotle's other conditions for self-change.

Second, consider Aristotle's argument that since self-movers can stop their own motion whereas the elements cannot stop their own motion, there is a good reason to think that the elements are not self-movers (*Phys.*VIII 4.255^{a8-10}). External objects often impede the downward motion of water and earth, as well as the upward motion of fire and air. But neither water nor earth will ever stop moving downward without something blocking its path (or until it has reached the center of the earth) for Aristotle. The same applies to the upward motion of fire and air (though in this case, until the fire or air has reached the opposite, uppermost position). Aristotle seems to think that this evident incapacity to stop by itself detracts from the autonomy of the natural upward or downward motion. This is, I think, an intelligent and important distinction. Imagine the difference between a novice skater struggling to keep his balance as he moves quickly across an ice rink, as opposed to an experienced ice hockey player moving in the same direction and at the same speed. Suppose that the novice could not stop if he wanted to stop, whereas the hockey player can stop immediately any time she wants to. While the novice and the hockey player move down the ice, no one is pushing or in any other way affecting their movement. It seems accurate to say that the hockey player is moving herself. But it's not at all clear that the novice is moving himself.

Applying this distinction to Aristotle's account of the capacities and activities of plants, Aristotle claims that "plants do not grow up but not down – instead, they grow alike

in both, indeed in all, directions; and that holds for everything which is constantly nourished and continues to live, so long as it can absorb nutriment" (*DA* II 2.413^{a26-28}). Aristotle specifies that plants grow in whichever directions are available, as long as they are constantly nourished and can absorb nutriment. This suggests that plants cannot stop or more generally alter or change their growth-methods and results. But this generalization should be qualified: Aristotle would presumably agree that many plants bend toward the sun, and that "plants send their roots down (not up) for the sake of nourishment" (*Phys.*II 8.199^{a27-28}). In those senses, growth in plants does seem directed at a specific goal, namely, nourishment and continued growth. That seems to lend it some autonomy. Also, Aristotle argues that animals are in some vital senses not in charge of the causes and necessary conditions of their own self-motion:

We must grasp the fact, therefore, that animals move themselves only with one kind of motion, and that this is not strictly originated by them. The cause of [animal self-motion] is not derived from the animal itself: there are other natural motions in animals, which they do not experience through their own instrumentality, e.g. increase, decrease, and respiration: these are experienced by every animal while it is at rest and not on motion in respect of the motion set up by its own agency; here the motion is caused by the environment and by many things that enter into the animal: thus in some cases the cause is nourishment – when it is being digested the animals sleep, and when it is being distributed they awake and move themselves, the first principle of this motion being thus originally derived from outside. Therefore animals are not always in continuous motion by their own agency: it is something else that moves them, itself being in motion and changing as it comes into relation with each several thing that moves itself (*Phys.*VIII 6.259^{b6-14}).

Aristotle holds, then, that animal self-motion is also reliant on many external and internal factors not in the direct or continuous control of the animal. An animal needs to rest while it is digesting a large meal. Animals are not in charge of how quickly they need to breathe in order to catch their breath after sprinting toward prey or after fleeing from a predator. Nor can animals control how much rain falls and, thus, how much the grass will grow. So, herbivores cannot control how much grass they have to feed on in a given area. Nor can carnivorous animals control how many herbivores are being reproduced. Similarly, plants are

not directly or continuously in control of the sources of their nutriment or the directions in which they can grow: if the soil dries up or is removed altogether then the plants' roots are unable to absorb nutriment, and thus the plant will be unable to absorb nutriment for further growth. Or, if the plant's position relative to the sun is entirely blocked by some obstacle recently placed, then most plants will be unable to grow – at the very least, their growth will be stunted.

But there seem to be some salient differences between the ways in which animals and plants are unable to control the internal and external factors relevant to their growth and survival: without the ability to move as a whole from one place to another, plants, unlike animals, are unable to move from one environment to another. Aristotle might well grant – in fact, from the passage from *Phys.*VIII 6 quoted above, it seems he does grant – that animals are not self-changers when it comes to processes such as their growth, decay, and respiration. But he seems to also hold that it is animals' unique ability to voluntarily move from one less hospitable environment to another more hospitable environment that makes animals and not plants the living things rightfully called "self-changers": he says that "animals move themselves only with one kind of motion", that is, locomotion (*Phys.*VIII.6.259^{b6}). A given plant's growth, metabolism, reproduction, and, more generally, survival are dependent on the *single* place in which that plant takes root. Should that environment prove inhospitable to the plant's growth, the plant must adapt or die. An animal, on the other hand, has the ability to move to an environment that is more likely to meet the conditions for its growth, reproduction, and survival. An animal can stop its attempt to grow and reproduce in in environment-1 and instead move to environment-2, whereas a plant is rooted either in environment-1 or in environment-2. In this crucial sense, it seems that growing roots, absorbing nutriment, growing in various directions, and other

natural changes in plants are not under the control of plants in the way required by this condition of Aristotle's for self-change. Plants cannot stop or more generally alter the environment in which they attempt to grow, even if their growth is perhaps in other senses not much less independent than the growth of most animals.

Daniel Graham in his commentary on *Physics* VIII gives some attention to this way in which Aristotle rules out the natural motion of the elements as self-motion, and briefly considers its application to change in plants. Graham considers a sapling under an outcrop of growth where the sapling could not reach the sunlight by growing upward; the sapling would grow sideways or downward; "The sapling would thus be able to act contrary to its natural tendency. But it seems false to say that it could have stopped its motion – i.e. its phototropic growth. Would its growth, then, count as a case of self-caused motion? In some sense it surely should" (1999: 80). But it seems to me that just because there might be some cases of activities in plants that seem in some attenuated sense to satisfy the self-stopping condition for self-motion, it does not follow that Aristotle would call any of those activities self-change. Rather, Aristotle seems to be giving something like jointly sufficient and individually necessary conditions for self-change, and the satisfaction (or near-satisfaction) of any one of those individually necessary conditions does *not* entail that the activity counts as self-change. And as I argue here and in Section 4, it seems to me that natural change in plants fails to satisfy several of Aristotle's necessary conditions for self-change.

A third way in which Aristotle argues that the natural motion of the simple bodies does not count as self-change is that each simple body moves in just one way, e.g., water naturally just moves down, whereas self-movers are capable of various different kinds of motion (*Physics* VIII 4.255^{a10-12}). True, as noted above, Aristotle observes, "plants send their toots down (not up) for the sake of nourishment" (*Physics* II 8.199^{a27-28}). So we might be

tempted to infer that, for Aristotle, just as water moves always down (never up) unless impeded, so plants' roots always grow down (never up) unless impeded; thus neither type of change counts as self-change. But it is not altogether clear that Aristotle would make a similar distinction to argue that growth in plants does not count as self-change. For he notes that plants are capable of not just increase (growth) and decrease (decay), but also reproduction and some qualitative changes such as leaves changing color, and producing seed and fruit: "For the food which plants absorb from the ground is already concocted, and they give off instead their seeds and fruits" (*Parts of Animals* II 10.655^{b34-35}).[27] Elsewhere, Aristotle observes, "even in plants we find in the same kind some trees which bear fruit and others which, while bearing none themselves, yet contribute to the ripening of the fruits of those which do, as in the case of the fig-tree and caprifig" (*Generation of Animals* I 1.715^{b21-24}). Aristotle goes on to argue that some plants "come into being from seed and others, as it were, by the spontaneous action of nature, arising either from decomposition of the earth or of some parts in other plants; for some are not formed by themselves separately but are produced upon other trees, as the mistletoe" (*Generation of Animals* I 1.715$^{b25-716a1}$). It seems, then, that the activities and processes in which plants engage cannot be so neatly grouped into just a single kind, whereas the natural motion of the simple bodies quite clearly can be grouped in such a way – upward motion of air and fire, and downward motion of earth and water.

However, Aristotle might well concede that there is some diversity in plants' activities and processes while denying that this diversity is significant enough to count as

[27] Aristotle claims here that the nutrients plants absorb from the ground is already concocted; implicitly, then, Aristotle seems to suggest that plants do not concoct their nutrients. So, plants have a nutritive process and a nutritive soul that do not require internal concoction. Plants can get all the nourishment they need to survive, grow, and so on, without any internal concoction, on Aristotle's account. I'll draw on facts such as these a little later on in the paper.

self-change or to reasonably approach the diversity, complexity, and unpredictability of animal self-motion. Even though the life-enabled activities and processes observed in plants are more complex and numerous than the natural motion of the elements, they are nowhere near as complex and numerous as, for example, the following animal activities recorded by Aristotle (a very small sample of all of the activities Aristotle records):

In the same way as men do, the bird mixes mud and chaff together; if it runs short of mud, it souses its body in water and rolls about in the dust with wet feathers; furthermore, just as man does, it makes a bed of straw, putting hard material below for a foundation, and adapting all to suit its own size (*HA* IX 7.612^{b22-26}).

Cranes will fly to a great distance and high up in the air, to command an extensive view; if they see cloud and signs of bad weather they fly down again and remain still. They, furthermore, have a leader in their flight, and patrols that scream on the confines of the flock so as to be heard by all. When they settle down, the main body go to sleep with their heads under their wing, standing first on one leg and then on the other, while their leader, with his head uncovered, keeps a sharp look out, and when he sees anything of importance signals it with a cry (*HA* IX 10.614^{b19-26}).

It's not merely the case that animals can move as a whole from one place to another whereas plants are incapable of that kind of self-movement. It's also the case for Aristotle that the *ways in* which, things *toward* which, and reasons *because* of which animals move are strikingly diverse and unpredictable. Besides the many methods of animal locomotion (they swim, slither, soar, crawl, glide, run, climb, burrow, and so on), in this small sample we find Aristotle describing animals mixing mud and chaff together in the same way that human beings do, and soaring high into the air not necessarily in search of prey but so as to get a better view of approaching bad weather. While it might be difficult in some cases to predict, for instance, what color a plant will turn or how long it will survive or how big it will grow, it seems *much* more difficult to predict the particular movements and behaviors of most animals. This evidence suggests to me, then, that though Aristotle would not necessarily rule out plants as self-changers immediately (whereas as he rules out the elements immediately) solely on the basis of the condition under consideration here, that is, self-movers are capable

of various different kinds of motion, nonetheless he would point to the unfavorable comparison with the diversity and complexity of movements in animals as a way of *undermining* the self-changer ascription for plants.

Fourth, Aristotle argues that the elements could not possibly be self-movers because nothing continuous and naturally unified (συνεχές τι καὶ συμφυὲς) can move itself, whereas the elements are continuous and naturally unified (*Phys.*VIII 4.255$^{a12-13)}$. For, Aristotle argues, "insofar as a thing is one and continuous not merely in virtue of contact, it is impassive: it is only insofar as a thing is divided that one part of it is by nature active and another passive" (255^{a13-15}). In order to be capable of moving itself, a thing must be divisible into a part that moves (in the transitive sense), that is, an active part, and a part that is moved, that is, a passive part. Earth, air, fire, and water have no parts. Nor do they do not have souls; so, they do not have a soul-part in contrast with their physical part. Nor do the elements have distinguishable physical parts: any given body of water, for example, is continuous throughout. So, Aristotle infers, the elements cannot be self-movers.

Now, Aristotle does note that plants have distinct parts: "The parts of plants in spite of their extreme simplicity are organs; e.g. the leaf serves to shelter the pericarp, the pericarp to shelter the fruit, while the roots of plants are analogous to the mouth of animals, both serving for the absorption of food" (*DA* II 1.412^{a28-b3}). Moreover, as already discussed, Aristotle does think that plants possess souls (though their soul has only the most basic capacities, namely, the nutritive and reproductive capacities). Thus, if Simplicius (1208.30-31) is correct in assuming that Aristotle means soul and body by the active and passive parts required for self-change, then it seems that plants satisfy this necessary condition for self-change. As I'll discuss in much more detail in Section 4, though, this conclusion ought to be significantly qualified: for Aristotle, due to the simplicity and in particular the earthiness of

plants' constitution, plants unlike animals are incapable of sensation: "It is clear that the body of an animal cannot be simple, i.e. consist of one element... All the other elements with the exception of earth can constitute organs of sense… That is why we have no sensation by means of bones, hair, and so on, because they consist of earth. So, too, plants, because they consist of earth, have no sensation" (*DA* III 13.435^{a11-12}, ^{15}, 25-435^{b2}). That the uniformity of plants' constitution makes them fundamentally incapable of sensation entails (as I explain in more detail in Section 4) that plants cannot possess what Aristotle considers to be the directing faculties for self-change, namely, *phantasia* and desire. Though plants do possess distinct parts both physically and with respect to the soul-body relation, they do not possess the *kind* of distinction between active and passive parts that allows them to engage in self-change, on Aristotle's account.

Finally, Aristotle argues that the elements have an inner source of motion, not in the sense of moving something or causing motion (οὐ τοῦ κινεῖν οὐδὲ τοῦ ποιεῖν), but of suffering motion (ἀλλὰ τοῦ πάσχειν) (*Phys.*VIII 4.255^{b29-31}). His point seems to be intended to further undermine the self-change ascription to the natural motion of the elements. Aristotle argues that even when water moves downwards without anything appearing to move it, nonetheless the water's natural motion *is* caused by something else in the sense that the water moves downwards (to the center of the earth) *if and only if* there is nothing impeding its downward movement (or if it has already reached the center of the earth). Water always has the potential to continue its downward movement, but whether or not that potential becomes actualized depends *entirely* on whether or not there are obstacles or barriers impeding the water's motion. Implicitly, Aristotle seems to be hinting at a contrast with the motion of most animals: just because a barrier to an animal's motion is removed, there is no guarantee that the animal will immediately start moving. Nor is there a guarantee

that the animal will move in any given direction, let alone continuously up or down. An animal has the potential to move from one place to another, *but* the removal of obstacles to the actualization of that potential does *not* automatically actualize that potential. Presumably with the other four conditions for self-motion in mind, Aristotle infers that the elements *do* have an inner origin, source or principle of motion, but a passive rather than an active source or origin.

Applying this distinction to Aristotle's account of plants, consider Aristotle's distinction between the reproductive faculties of animals and those of plants. He notes that in locomotive animals the male and female principles are always separated, requiring males and females to seek each other out in order to reproduce, whereas in plants the male and female principles are united:

> In all animals which can move about, the sexes are separated, one individual being male and one female, though both are the same in species, as with man and horse. But in plants these powers are mingled, female not being separated from male. That is why they generate out of themselves, and do not emit semen but produce an embryo, what is called the seed (*Generation of Animals* I 23.730^{b32}-731^{a4}).

Perhaps there is a sense in which plants' reproductive methods are more self-sufficient than animals' methods; after all, animals rely on the presence and functions of a suitable mate in order to reproduce, whereas plants rely merely on themselves. But I doubt Aristotle would see this as a reason to consider plants' reproduction closer to self-change than animals' reproduction. For on his account, there seems to be an important and relevant sense in which plants' methods of reproduction are examples of a passive rather than an active source of change within them. Plants, Aristotle reminds us, "are observed to possess in themselves an originative power through which they increase or decrease in all spatial directions… and that holds for everything which is constantly nourished and continues to live, so long as it can absorb nutriment" (*DA* II 2.413^{a25-26}, ^{28}). Aristotle also argues that "to

the essence of plants belongs no other function or business than the production of seed; since, then, this is brought about by the union of male and female, nature has mixed these and set them together in plants" (*Generation of Animals* I 23.731[a25-27]). On Aristotle's account, then, it seems that plants reproduce out of themselves and grow in all directions as long as they are continuously and adequately nourished and as long as nothing external is damaging or destroying them. This is their only function or business. For example, unlike animals, plants have no need to actively seek out (or even, in the first place, to *desire*) a mate for reproduction. So it appears that, in a sense, plants are caused to grow and reproduce just as the elements are caused to engage in their natural upward or downward motion: plants continuously grow and reproduce, engaging in their natural forms of change *if and only if* there is nothing impeding their growth and reproduction.

Of course, Aristotle is well aware that animals' activities are deeply dependent on factors largely outside animals' control: respiration, digestion, plentiful food in an environment as opposed to a drought, and so on (*Phys.*VIII 6. 259[b6-14]). But animals seem to have a much more active type of control over when, where, and how they reproduce and receive nourishment. If something is impeding an animals' ability to receive nourishment or reproduce, the animal can in many cases move away from that impediment and/or use a defense mechanism against it. Also, animals do not always take in nutriment if it's available for them and nothing physically prevents them from consuming the food and absorbing the food's nutriments. Nor do animals automatically reproduce if there is a viable mate for reproduction available at a given time. For an animal with readily available sources of nutrition and a viable mate available might reject both courses of action and instead prioritize the survival and safety of their young, as, for instance, bears seem to do when (as Aristotle observes in the biological works) they "push their cubs in front of them, or take the

cubs up and carry them" so as to ensure the survival and safety of their young (*HA* IX 6.611[b33]). This is due to something uniquely implanted in animals (and only in animals with a reasonably high level of intelligence), on Aristotle's account: "Nature seems to wish to implant in animals a sense of care for their young… In those which have the greatest portion in intelligence we find familiarity and love shown also towards the young when perfected…" (*GA* III 2.753[a7-8]). For Aristotle, then, growth and reproduction in animals seems much more directly in the control of animals than growth and reproduction in plants is in the control of plants.

However, I should be cautious not to overstate the asymmetries Aristotle sees between growth and reproduction in animals compared with growth and reproduction in plants, especially as his account relates to self-change. For example, Aristotle explains that, in both plants and animals, nothing generates itself but, once the living thing has been generated, the living thing (plant or animal) increases itself (*GA* II 1.735[a13]). From the first part of the living thing, plant or animal, that is generated, comes the nutritive power to increase, and Aristotle describes this power of increasing as a kind of self-originating power. In animals this first part will be the heart but it will be some other part in living things without a heart – presumably Aristotle means some analogous part in plants (735[a20-25]). *De Motu Animalium* 5 is another stretch of text where Aristotle claims that no living thing can generate itself: "The first growth and alteration, however, take place by another's agency and through other means" (*De motu* 5 700[a34-35]). In both plants and animals, then, it seems that there is a similar dependency on the motion of another thing for generation, and a similar independency once the animal or plant has been generated. In particular, it seems that if plants are not generative self-changers then neither are animals. And, in a sense, if animals are self-changers with respect to their growth then so, too, are plants.

I wish to concede these points without contradicting (or, I think, significantly qualifying) the points I made above: it is still the case that, once generated, animals can self-move from one environment to another whereas plants are incapable of that movement; it is still the case that animals have more control and independency than plants do when it comes to what they eat and when they eat it; and it is still the case that animals have more control and independency than plants do when it comes to how and when they reproduce. Even if an animal requires the locomotion of its parent animals in order to engage in any kind of self-motion throughout its life, it is still true, for Aristotle, that most generated and completely developed animals can select one food source or another based on factors such as their judgment of the danger of nearby predators, the increasing hunger of their own offspring, the boundaries of the animal's territory in competition with the territories of rivals, and other such things springing (at least in part) from the animal rather than (exclusively) the animal's environment. And it is still true that plants are incapable of making these sorts of self-originating judgments and acting on those judgments, moving from one candidate for a food source to a seemingly superior candidate. This is due, in part, to the physical constitution of plants in comparison with the physical constitution of animals: plants cannot uproot or transplant themselves, for example, whereas animals have legs, wings, fins, and so on.

Even if it's true that plants self-increase, for Aristotle, it's also true on his account that plants are designed so as to self-increase in a single place and in a way that is more heavily and passively dependent on a single environment than the analogous self-increase processes in mobile animals. In Aristotle's view, nature has designed all of this in a sensible and efficient way by, for instance, separating the generating agents (male and female) in animals but combining the male and female in plants. Plants are designed by nature so as to

be more dependent on their environment for their growth and reproduction, even if it is also true for Aristotle that both plants and animals rely for their generation on antecedent motions of something else, and even if it is also true for Aristotle that even plants self-increase. Though Aristotle holds that (unlike the elements) once the plants are generated their reproductive and nutritive soul-functions are in a sense causally responsible for their changes (including growth and reproduction), on my understanding of Aristotle's distinctions he would also say that there are profoundly important differences between the causal responsibility of nutritive and reproductive functions isolated from all other functions in a soul (as they are in plants' souls) as opposed to the causal responsibility of nutritive and reproductive functions combined with soul-functions such as sensation and desire. In the next section I'll say much more about the dependence-relevance of these additional soul-functions.

IV. FOR ARISTOTLE, PLANTS ARE INCAPABLE OF SENSATION AND THEREFORE LACK DESIRE AND *PHANTASIA* (THE DIRECTING FACULTIES FOR SELF-CHANGE)

Aristotle holds that plants are incapable of sensation (αἰσθήσεως):

Now of the faculties of the soul which we have mentioned, some living things, as we have said, have all, others only some, and others again only one. Those which we have mentioned are the faculties for nourishment and growth [θρεπτικόν], for sensation [αἰσθητικόν], for appetite [ὀρεκτικόν], for movement in space [κινητικὸν κατὰ τόπον] and for thought [διανοητικόν]. Plants have the nutritive faculty only [τὸ θρεπτικὸν μόνον] (*DA* II.3.414^{a29}-414^{b1}).

He is not very precise in his lists of the capacities of the soul: he omitted the capacity for appetite from his earlier list (at 413^{b13}). But read in context, his intended distinctions are quite clear: in general, assuming it is not an incomplete specimen such as a small child or a severely disabled person or a madman, only (and all) human beings have all of the capacities mentioned above including the capacity for thought (διανοητικόν). And in general the non-

human animal, assuming it is not an incomplete specimen such as a fetus or severely damaged or a member of an unusually basic species (such as the sea squirt, sea anemone, or sea sponge) has all of the capacities of the soul except the capacity for thought. And the plant (τὸ φυτόν) has only the capacity to take in nutrition, grow (presumably Aristotle would acknowledge that growth is often just a change in quantity but also changes in quality, e.g., in color), and reproduce.

But *why* does Aristotle hold that plants are incapable of sensation, and what are the consequences of this distinction? I'll begin with the first question.[28] Aristotle states that it must be taken as a general rule that:

> All sensation is the receiving of forms without matter [ἄνευ τῆς ὕλης], as wax receives a seal without the iron or gold of the signet-ring. It receives an imprint of the gold or bronze, but not *as* gold or as bronze [ἀλλ' οὐχ *ᾗ* χρυσὸς ἢ χαλκός, italics are mine]. Similarly the sense of any sense-object is acted upon by a thing having color or flavor or sound; not, however, in respect of what each, is called as a particular thing, but in so far as each has a certain quality and according to its formula [ἀλλ' ᾗ τοιονδί καὶ κατὰ τὸν λόγον]. The primary sensitive part [αἰσθητήριον δὲ πρῶτον] is that in which [ἐν ᾧ] a power [δύναμις] of this sort resides. They [part and power] are indeed the same thing, but differ in mode of being [τὸ δ' εἶναι ἕτερον]. What receives sensation will be an extended magnitude [μέγεθος], but neither being sensitive nor sensation is a magnitude. Each is, rather, a certain ratio and *power of a magnitude* [ἀλλὰ λόγος τις καὶ *δύναμις ἐκείνου*] ($424^{a17\text{-}28}$).

When a dog smells a tasty treat, the treat might be nowhere near the dog's nose. It might be quite far away. There does not have to be contact between (a) the dog, let alone the part of the dog that receiving the sensation (the smell), and (b) the thing sensed, namely, the treat. The dog is an extended magnitude (μέγεθος), as is the treat and the dog's nose. But the smell itself is not, according to Aristotle, an extended magnitude. The dog's nose and the dog's ability to smell are indeed the same thing, but they are different in their mode of being: the

[28] One interesting avenue I'll not have space to explore here is a teleological approach to answering this question and related questions. That is, Aristotle holds that plants lack sensation not just because of the constitution and collection of other capacities of plants but, more fundamentally, because (a) nature does nothing in vain and (b) plants do not require sensation in order to survive and reproduce. For analyses and interpretations of relevant aspects of Aristotle's notion of teleology, see, for example, Bodnar (2005), Friedman (1986), Henry (2013), Johnson (2005), Nielsen (2008), and Leunissen (2010a) and (2010b).

former is an extended magnitude whereas the latter is not (as described in the passage above but also in *DA* III.2.425^{b27-30}) The treat is perceived by the dog *not as what it is*, as a particular form-and-matter compound, namely, a chunk of dried-out meat. Rather, the treat is perceived as a smell so inviting that the dog runs in the direction the dog assumes will lead to the source of the smell. It is perceived as a quality of the treat, and only the form (not any matter) is processed by the dog's nose, the relevant sense organ – no matter from the treat needs to reach the dog's nose.[29]

The sensed quality, the smell of the tasty treat, must fall within a certain range of ratios in relation to the sense organ doing the sensing. The former cannot be excessive, and mutatis mutandis for a case of hearing, seeing, or tasting, and presumably (though Aristotle does not make it explicit) it cannot be too subtle or slight (*DA* II.12.424^{a29-34}). If the smell were overwhelmingly great in relation to the dog's sense of smell, where the latter is a non-magnitude having power of a magnitude (the dog), then the dog's sense of smell is destroyed.[30] Similarly, twanging cords too violently destroys the tone and harmony of the instrument. For the tone and harmony of the instrument depends on a certain range of ratios between the force with which the cords are twanged and the capacity of the cords to withstand a forceful twang while producing a harmonious sound from that twang. Plants

[29] Aristotle's account of sense perception in the *De Anima* is a topic fraught with controversy in the secondary literature. But the distinctions I make here manage, I think, to steer clear of most of the controversial claims. I am not, for instance, taking a particular stand with respect to the problem of whether or not Aristotle's account requires that sense organs literally take on the qualities of their proper objects. For more on that problem and some related problems, see Burnyeat (1995) and (2002), Everson (1996), Johansen (1997), Johstone (2012), Kahn (1966), Magee (2000), and Sorabji (1971). My focus lies elsewhere.

[30] Aristotle says that the excess of sensible qualities destroys (φθείρουσι) the sense organs. But the action here is ambiguous. It could mean (1) the sense organ is destroyed such that it cannot sense anything in that given instance and never can sense again, or (2) it can't sense anything in that particular instance due to the excess but might be able to sense something later on. Similarly, cords can be twanged too violently such that an unharmonious sound is produced and the cords are broken, or cords can be twanged too violently such that an unharmonious sound is produced and the cords are left intact. I suspect that Aristotle intends (1), not (2). This seems more plausible. If one is in a very dark room for hours and then suddenly one walks into an extremely bright room, it is very difficult to see. But one is not necessarily blinded permanently.

"have some share in soul (ἔχοντά τι μόριον ψυχικὸν)" and they become hot when touched by a hot object, and cold when touched by a cold object. But plants do not have a mean or middle thing (μὴ ἔχειν μεσότητα) acting as a principle of this kind (μηδὲ τοιαύτην ἀρχὴν), so as to receive *only* the forms of sense-objects. But such a mean or principle is a necessary condition for sensation:

> Perception is a form of being acted upon. Hence that which an object makes actually like itself is potentially such already. This is why we have no sensation of what is as hot, cold, hard, or soft as we are, but only of what is more so, which implies that the sense is a sort of mean between the relevant sensible extremes. That is how it can discern sensible objects. It is *the mean* [τὸ μέσον] that has the power of discernment; for it becomes an extreme in relation to each of the extremes in turn; and just as that which is to perceive white and black must be actually neither, but potentially both (and similarly with the other senses), so in the case of touch it must be neither hot nor cold (*DA* II.11424[a2-10]).

Part of the reason Aristotle thinks that plants lack the mean requisite for sensation is that plants are composed of earth (γῆς): "It is clear that the body of an animal cannot be simple, i.e. consist of one element... All the other elements with the exception of earth can constitute organs of sense… That is why we have no sensation by means of bones, hair, and so on, because they consist of earth. So, too, plants, because they consist of earth, have no sensation" (*DA* III 13.435[a11-12], [15] -435[b2]). Aristotle holds that earth is cold and dry, water cold and fluid, air hot and fluid, and fire hot and dry (*De Gen et Corr.*330[b3-5]). The sense of touch perceives all four characteristics and is necessary for any other type of sensation (*DA* III.13.435[b3-5]). Plants lack the sense of touch. Without the mean between extremes affecting the plant, the plant always receives the matter alone or the form-and-matter compound (ἀλλὰ πάσχειν μετὰ τῆς ὕλης) but never the form alone as required (*DA* II.12.424[a35-b3]). As such, plants are certainly incapable of sensation.[31]

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[31] In all of Plato's extant writings, there is only one passage in which plants are given anything like a careful examination or description:

But for Aristotle, sensation is necessary for any further capacities of the soul, including self-locomotion and its directing faculties, namely, desire and *phantasia* – *phantasia* is translated "imagination" in Shields (2016) and Reeve (2017), but often it is just transliterated in the literature.[32] Creatures endowed with sensation and other capacities of the soul including desire, appetite, and self-locomotion move just insofar as they avoid objects of pain and seek objects of pleasure: "That which is in accordance with nature is pleasant. And all animals pursue pleasure which is in accordance with nature" (*Historia Animalium* IX 1.589^{a8-9}).[33] Aristotle thinks that "all animals have the perception of pleasure that comes from

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> Now when all the parts and members of the mortal being were created in union, and since his life was perforce dependent upon fire and air, and therefore his body suffered waste through being dissolved and left void by these, the gods devised succor for him. They engendered another nature akin to the nature of man, blending it with other forms and sensations, so as to be another kind of animal [ἕτερον ζῷον]. These are the cultivated trees and plants and seeds, which are now trained by culture and domesticated with us; but formerly there existed only the wild kinds, which are older than the cultivated. For indeed everything which partakes of life may with perfect justice and fitness be termed an animal; but the kind of which we are now speaking shares only the third form of soul, which our theory says is seated between the midriff and the navel, and which has nothing to do with opinion and reasoning and thought, but only with sensation, pleasant or painful, with appetites accompanying. For it ever continues passively receptive of all sensations, and having its circulation in itself about its own center, it rejects all motion from without and uses only its own; but its nature has not bestowed upon it any power of observing its own being and reflecting thereon. Wherefore it is indeed alive and in no wise differs from an animal, but it is stationary and rooted fast, because it has been denied the power *of self-motion* [διὰ τὸ *τῆς ὑφ' ἑαυτοῦ κινήσεως* ἐστερῆσθαι] (*Timaeus* 77a-c, italics are mine).[31]

This is a rich passage that deserves more attention than my focus here warrants and space here allows. But it's quite clear – and an extensive study of this passage in Carpenter (2010) seems to agree – that Plato here ascribes to plants a basic form of sensation (αἰσθήσεως), the ability to feel pain and pleasure, and some corresponding desire (ἐπιθυμιῶν), while denying plants the capacity for self-observation, self-reflection, and self-motion. In fact, Carpenter argues that plants are ascribed some form of intelligence in the *Timaeu*s.

[32] Everyone knows that "imagination" is the conventional English translation of Aristotle's Greek, φαντασία, and everyone knows that this is not an ideally accurate translation. But no one seems to know how to translate *phantasia* more accurately in English. Aristotle tells us in the *Rhetoric* that *phantasia* is "a weak sort of perception" (I 11.1370a28-29), and in his extant work on dreams he says that *phantasia* is the same thing as perception, though they differ in their being (*De insomniis* 459a16-21). In *De Anima* III 3.3, a notoriously difficult text, Aristotle argues that *phantasia* is the capacity responsible for producing images, but he also argues that *phantasia* explains appearances. The ordinary sense of "imagination" is something like the faculty of forming new ideas, images, or concepts of things not present to the senses; or, more generally, the ability of the mind to be creative or resourceful. That does not sound like what Aristotle has in mind for the functions of *phantasia*. I'll leave φαντασία transliterated but untranslated, as is done, for example, in Caston (1996), Moss (2012) and Scheiter (2012).

[33] Aristotle builds on this account in the *Nicomachean Ethics* VII and X.

food" explaining why all animals "have appetite for food" (*Parts of Animals* II 17.661^a6-8^). For Aristotle, the origin of self-motion in animals is "the object of pursuit or avoidance in the sphere of action" (*De motu* 8.701^b32-33^).[34] The faculty of desire targets an external object as one of pleasure or one of pain. Then it acts accordingly: it pursues the object if it's taken to be one of pleasure, and avoids the object if it's taken to be one of pain: "For the painful is avoided and the pleasant pursued" (*De motu* 8.701^b35-36^). Animals are impelled to move, then, by desire. Desire cannot operate without pleasure or pain. Pleasure and pain require sensation. The external object moves desire: "the proximate reason for movement is desire, and this comes to be either through sense-perception or through *phantasia* or thought" (*De motu* 7.701^a35-37^). So Aristotle concludes, "insofar as an animal is capable of desire [ᾗ ὀρεκτικὸν] it is, in virtue of this, capable of moving itself [ταύτῃ αὑτοῦ κινητικόν]; but it is not capable of desire without *phantasia* [οὐκ ἄνευ φαντασίας]" (*DA* III 10.433^b27-28^). Animal self-motion is directed by the faculty of desire, working together with *phantasia* as a basic form of mind, reason or *nous*.

In short, an animal engages in self-locomotion when it is pursuing an object of pleasure (such as going to the market to make money, finding a mate, finding food, feeding its young) or avoiding an object of pain (such as avoiding going to the market so as not to have to pay a debt, swimming from an animal which has bitten it and is chasing it, running from a forest fire). But all of these activities require at least a basic form of sensation – feeling pleasure or pain – along with some basic form of desire and appetite corresponding to that sensation of pleasure or pain as an impetus:

To be perceiving, then, is like bare saying or thinking; but whenever it is pleasant or painful, as if it were affirming or denying, it pursues or avoids, and to feel pleasure and pain is to act with the perceptual mean in relation to what is good or bad insofar as they are such; and

[34] English translations of *De motu animalium* are taken from Nussbaum (1978).

avoidance and pursuit when actual are the same. And what is capable of pursuing and what is capable of avoiding are not different, either from one another or from what is capable of perception; but their being is different (*DA* III.7.431^{a8-14}).

Without sensation or a sense of pain and pleasure, and therefore without *phantasia* and desire, plants are incapable of trying to engage in any self-directed responses to stimuli. Plants cannot affirm or deny, pursue or avoid. For Aristotle, therefore, plants cannot engage in the internal image forming or desiring processes in order to pursue or avoid anything.[35]

More precisely, for Aristotle, whereas animals often engage in voluntary motions when they perceive an external object, form an internal image of that object, take that image to be one of pleasure or one of pain, and then pursue or flee from the object accordingly, plants do not possess the requisite faculties for voluntary movements or changes. For, on Aristotle's account, there are voluntary, involuntary, and non-voluntary movements and changes. Involuntary movements and changes include "those of the heart and the penis; for often these are moved when something appears, but without the command of thought" (*De motu animalium* 11.703^{b5-7}). Non-voluntary movements and changes include "sleep and waking and respiration, and all the others of this kind; for neither *phantasia* nor desire is, strictly speaking, in control of any of these" (*De motu* 11.703^{b8-10}). Without sensation and thus without any form of *phantasia* or desire, plants are confined to involuntary and non-voluntary movements and changes. A plant sending down its roots for nourishment and then absorbing nutriment through its stem are processes that happen without the command of thought, and are not controlled by *phantasia* or desire. That includes processes by which

[35] The pseudo-Aristotelian treatise *On Plants* 815b16 says that Anaxagoras, Empedocles, and Democritus argued that plants have thought (νοῦν), knowledge (γνῶσιν), as well as sensation and desire/appetite. If that's true then in arguing that plants have only vegetative and reproductive capacities, Aristotle isn't just parting company with Plato: he's parting company with Anaxagoras, Empedocles, and Democritus. Sextus Empiricus (*adv. math.* VIII 286 confirms that Empedocles attributed reason to plants. Diogenes of Apollonia (Theophrastus *de sensu* 44) disagreed. But earlier (pre-Plato) thinkers often did not carefully distinguish, or distinguish at all in some cases, between sensation and reason. So it's unclear precisely how generous they were with plants, even if it is certainly clear that they were more generous than Aristotle was.

plants replace themselves with something that is not the same as them in number (ἀριθμῷ μὲν οὐχ ἕν) but the same as them in form (εἴδει δ' ἕν) (*DA* II.4.415^{b7-8}). Though Aristotle says that this makes it appear that plants partake or try to partake in the imperishable, eternal or divine (τοῦ ἀεὶ καὶ τοῦ θείου), this would, I think, occur without any self-change. The product of endless generations of successive generations of plant might well result in plants having a share of the eternal and the divine, but plants do not have the faculties of the soul (or the physical constitution necessary for sensation and other capacities) to desire such an end. As such, it seems to me that growth, absorption of nutrition, changing color, phototropism (bending toward the sun), forming seed and fruit, and other natural processes in plants that appear somewhat autonomous and self-directed would not count for Aristotle as genuine instances of self-change.

V. CONCLUDING REMARKS

A lot of scholarly attention has been given to Aristotle's account of how and why animals are capable of moving themselves. But no one has asked the question, whether self-change is possible in plants, on Aristotle's account. I gave some reasons why this topic is worth exploring. I then argued that given (1) Aristotle's means of drawing distinctions between the natural motion of the elements and self-motion of animals from *Physics* VIII 4, (2) Aristotle's account of growth, metabolism, and reproduction in plants, and (3) Aristotle's holding that without sensation a creature cannot possess the directing faculties for self-change, namely, desire and *phantasia*, it follows that (4) for Aristotle, plants are not self-changers, and are incapable of self-change.

In my view, (1)-(4) in the context I've given in this paper allow us to get clearer on why self-motion is, for Aristotle, unique to animals and, in particular, the specific role and limitations of a plant's nature, its inner source of change and stability, motion and rest, in

comparison with the nature and soul of an animal. A plant's soul and nature, for Aristotle, allow it to remain a unified, living whole while engaging in intricate processes required for growth and reproduction. In fact, in some ways plants seem to be more self-sufficient than animals are. For instance, (as I explained in Section 3), plants' reproductive methods are such that the male and female principle are united in each individual plant, such that a plant has no need to go in search of a suitable mate for reproduction. But as I argued in Sections 3 and 4, there are, I think, compelling reasons within Aristotle's account to hold that plants are incapable of self-change.

Also, I think that my discussion and findings here can shed some light on our understanding of the status of plants in Aristotle's studies of nature. Without carefully surveying plant-passages and their context in Aristotle, it appears to be a broad but safe generalization that in an important sense plants occupy a middle ground for Aristotle: like animals, plants are alive and have a nature (an inner source of change and stability), but like the non-living things plants seem to be incapable of sensation, desire, *phantasia*, self-locomotion, and reasoning. But as I hope to have shown here, there is a good deal of nuance that ought to be added to that generalization. Some of that nuance seems to place plants closer to the status of animals in Aristotle's hierarchy: there is some prima facie compelling evidence to think that Aristotle's plants are not implausible candidates for the ascription of self-changers. Other details place plants closer to the status of the elements and the simple bodies: I argued that the evidence suggests Aristotle's plants, like the elements, have an inner source of motion in the passive rather than in the active sense. That is, plants' survival, growth and reproduction are dependent on the hospitability of a single environment, and

plants actualize their potential for natural change (just as the elements do) continuously and automatically provided that there are no obstacles or impediments to their natural change.[36]

[36] For helpful comments on a previous draft of this paper, I am grateful to an anonymous reviewer for *Rhizomata*. Other acknowledgements have been omitted for blind review.

CHAPTER 5

THE SOULS OF SELF-MOVERS

Abstract: I give a new, unified reading of Aristotle's *De Anima* iii 9-10. I read Aristotle as arguing that unlike most other capacities, in an important sense voluntary self-locomotion seems to require the use of more than one faculty of the soul. This has implications for our understanding of Aristotle's theory of the soul, especially how its parts or faculties function and are organized. Whereas, for example, (a) the nutritive faculty alone is responsible for growing, (b) *phantasia* alone is responsible for dreaming, and (c) intellective *nous* alone is responsible for abstract thought, (d) voluntary self-locomotion requires that practical *nous* and *phantasi*a function together with the faculty of desire, even if desire is still the primary factor. This reading eases the tension between iii 9's arguing that neither *nous* nor desire is the source of voluntary self-locomotion and iii 10's arguing that desire and *nous* are both the source. It also helps to explain why Aristotle sometimes expresses uneasiness about positing distinct parts of the soul. Finally, it sheds light on how Aristotle understands the causes of animal self-motion.

I. INTRODUCTION

In Chapter Three, I described desire and *phantasia* as 'the directing faculties for self-change'. What exactly does it mean to say that, for Aristotle? How is the soul of a self-moving animal structured? This chapter will answer those questions. In doing so, this chapter will help to show why animal self-motion is independent, autonomous, and self-directed (despite its being reliant on may internal and external factors outside its control, as we saw in Chapter One and Chapter Three). We've seen that Aristotle has philosophically and scientifically interesting reasons to distinguish between the motion of animals and the motion of the elements. We've also seen that Aristotle has the resources to explain why

growth, metabolism, and reproduction in plants can't count as self-change, unlike running, flying, swimming and so forth in animals. But this still leaves rather unclear the matter of why, precisely, animal locomotion counts as self-motion. Yet that matter seems absolutely central to a study of Aristotle's account of animal self-motion.

Aristotle's *De Anima* iii 9 begins by recapitulating the thesis – already stated in *De Anima* iii 3.427a17-20, partially established earlier on in *De Anima* especially in ii 1 through 5, and apparently taken as a reasonable way in which others have proceeded – that 'the soul' (ἡ ψυχὴ), the thing that gives plants and animals their capacities, the thing that makes living things alive has been defined (ὥρισται) by two capacities (δυνάμεις): first, by the faculty of judgment (κριτικῷ), which is the work (ἔργον) of thought (διανοίας) and perception (αἰσθήσεως); and, second, the capacity to move from one place to another (κατὰ τόπον κίνησιν), that is, by its initiating locomotion voluntarily (*De An.* iii 9.432a15-17).[37] Aristotle says that the former has been examined already (throughout *De Anima* II 2-3 and III 3-8). Now in III 9, he turns his attention to the second capacity. What is the mover in the soul that is the source of and thus explains how and why most human and non-human animals have the capacity to move from one place to another voluntarily, that is, apparently just because they want to do so? Is the mover (τὸ κινοῦν) some single part (ἕν τι μόριον) of the soul, and if so, is it separate (χωριστὸν) in magnitude (μεγέθει) or merely in its account

[37] As Moss (2012: 3-4) notes, we can understand what Aristotle means by the discerning faculty (κριτικῷ) as cognition, including (1) imagination, (2) perception, and (3) intellect or thought. On Aristotle's account, only human and non-human animals have cognition, though non-human animals lack (3); plants have souls but plants do not have any of (1)-(3). Ross (1961: 284) points out that *De Anima*'s first statement of this thesis, in III 3.427a17-20, has an apodosis that groups together τὸ νοεῖν ('the thinking'), τὸ φρονεῖν ('the understanding' or 'the exercising of practical wisdom') and τὸ αἰσθάνεσθαι ('the perceiving' or 'the sensing') as forming one of the two things by which the soul is usually defined. Aristotle's *Nicomachean Ethics* VI 3-7 provide a more careful treatment of the different kinds of knowledge than anything found in *De Anima.* Plants don't have either capacity, neither discernment nor voluntary self-locomotion. But most animals have both capacities to at least some degree. So Aristotle has in mind here the souls of animals in particular, rather than also the souls of plants.

(λόγῳ)? Or, is the mover the whole soul (πᾶσα ἡ ψυχή)?[38] *De Anima* III 9 and III 10 attempt to answer those questions.

Early on in III 9, Aristotle asks, if the mover is a part of the soul, then is it some special (ἴδιόν) part other than the parts 'customarily mentioned and ordinary discussed, or whether it is some one of them' (τι παρὰ τὰ εἰωθότα λέγεσθαι καὶ τὰ εἰρημένα, ἢ τούτων ἕν τι) (III 9.432a21-22)? In human and non-human animals that can move themselves, are they moved by their whole soul, or are they moved by a part (or a collection of parts) of their soul? If they're moved by a part or parts rather than by the whole of their soul, are those parts other than those customarily mentioned and already discussed, or is that part (or collection of parts) among those customarily mentioned and already discussed? In III 9, Aristotle gives arguments for strictly negative conclusions, merely eliminating candidates for answers. In III 10, he will argue that the source of voluntary self-locomotion in animals' souls is desire and *phantasia*, the latter taken as a kind of practical *nous* or intellect and the former taking the role of the most important source: 'In general, then [ὅλως μὲν οὖν], as we have said [ὥσπερ εἴρηται], an animal has the capacity to move itself insofar as that animal has the faculty of desire [ᾗ ὀρεκτικὸν τὸ ζῷον, ταύτῃ αὑτοῦ κινητικόν]; and desire is never without imagination [ὀρεκτικὸν δὲ οὐκ ἄνευ φαντασίας]' (*De An.* III 10.433b27-29).

Some preliminary distinctions are in order. Aristotle is in this context exclusively interested in a very specific kind of change: voluntary self-locomotion.[39] Though the word

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[38] All Greek text is taken from the OCT, Ross (1956). English translations are generally taken from Shields (2016), with some of my own minor modifications. For example, Shields translates τὸ αἰσθητικόν 'the perceptual faculty' whereas I translate it 'the faculty of sensation'. I prefer 'sensation' because this leaves more room for the important faculty of *phantasia*. 'Perception' seems to connote that there is a good deal more going on through τὸ αἰσθητικόν than just seeing, smelling, hearing, touching, and/or tasting. But this seems a departure from what Aristotle usually takes as the main role for τὸ αἰσθητικόν. Also, Shields translates *phantasia* 'imagination' whereas I leave *phantasia* merely transliterated – see footnote 6.

[39] Aristotle's account of animal self-change has received a good deal of scholarly attention: Berryman (2002), Corcilius and Gregoric (2013), Freeland (1994), Furley (1978), Gill (1991), Meyer (1994), Morison

'κίνησις' is normally – both in Aristotle and in most others including Plato – generally better translated 'change' rather than 'motion', we can here understand it as 'motion'. Aristotle is not interested in the source of change by growth and decrease; change by coming to be or ceasing to be; or in change by gaining or losing a quality (alteration). For Aristotle specifies at the outset that he is interested in change 'κατὰ τόπον', that is, change in place. Plants don't do that. Heliotropism or phototropism, the turning or growing of plants toward sunlight thus increasing their chances of growth and prolonged survival doesn't count as the kind of motion Aristotle is interested in. For that kind of motion doesn't require that the plant changes in place. Nor is Aristotle interested in the changes that occur by inhaling and exhaling, or in those that occur by sleeping and waking – those are discussed in the *Parva Naturalia* (see, for example, on respiration, *De somno* 456a1-24, *De juv.* 5, *De resp.* 8). Again, those sorts of changes do not require that the animal as a whole move from one place to another. Rather, such changes merely require that a part of the animal move. Moreover, even if it might seem fairly obvious in this context, it should be made clear that Aristotle is not interested in cases in which an animal is moved by force against its volition. Nor is he interested in rectilinear motion, circular motion of revolution around a center, or any combination of such kinds of motions (on these, see for instance *Physics* 261b28-29 and *De Caelo* 268b17-24). Finally, Aristotle is not interested in locomotion that merely seems self-originated but is not in fact voluntary; that is, he's interested in the self-motion of which most animals are capable and which most animals do very often, as opposed to the natural upward motion of fire and air and the natural downward motion of earth and water. *Physics* VIII 4.254b12-256a3 contains perhaps the clearest distinction between (a) the natural motion of the elements or simple bodies and (b) genuine, voluntary self-locomotion.

(2004), Wardy (1990: 93-99, 112-119), and Waterlow (1982: 204-261). But the way I resolve the tension between *DA* III 9 and III 10, as well as the reading I give for these texts are not explored in that literature.

Aristotle argues that whereas, for example, animals are capable of stopping their self-motion, water cannot stop itself from moving continuously downwards unless impeded by some obstacle – ditto for fire and air moving upwards, and earth moving downwards.[40]

Though it's true that in a sense Aristotle's interest in *De Anima* III 9-10 is remarkably specific, voluntary self-locomotion as opposed to any other kind of change, in other senses the topic is strikingly broad. Indeed, it is a little surprising that it has taken Aristotle this late in the treatise to address it. First, Aristotle's vast biological works are filled with descriptions of animals flying, running, swimming, gliding, crawling, slithering, climbing, hopping, and buzzing around not because they are being pushed or pulled but usually because their prey or food source or shelter is some distance away, or because a predator or some other undesirable thing is nearby.[41] So, given that human and non-human animals make up one of the two main groups of living things (plants being the other), it seems that a treatise on the

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[40] It is neither anachronistic nor anti-Aristotelian to use the term 'voluntary' in 'voluntary self-locomotion' to pick out what, precisely, Aristotle is interested in throughout *De Anima* III 9-10. For in Aristotle's account of the voluntary and involuntary in his *Nicomachean Ethics* III 1-5, the involuntary is what something does by force (βίᾳ) or through ignorance (δἰ ἄγνοιαν), as opposed to having the principle or source or origin (ἀρχή) of the action in the agent, whether that agent is a human or non-human animal (1109b35-1110a1). For much more comprehensive accounts of Aristotle's account of the voluntary, see McGinley (1980), Meyer (1993), Meyer (2006), Muller (2015), Nielsen (2007), and Sakezles (2007). Aristotle also distinguishes between the voluntary and the non-voluntary; this distinction is applied in a more pertinent context, in his work on the motion of animals: 'We have now explained how animals move with voluntary [ἑκουσίους] motions, and for what reasons. But they also display involuntary [ἀκουσίους] movements in some of their parts, and more often non-voluntary [οὐχ ἑκουσίους] movements. By involuntary I mean such movements as those of the heart and the penis; for often these are moved when something appears, but without the command of thought. By non-voluntary, movements such as sleep and waking and respiration, and all the others of this kind; for neither *phantasia* nor desire is, strictly speaking, in control of any of these' (*De Motu* 11 703b2-10, trans. Nussbaum 1978). Ackrill (1978) is helpful on the context and character of Aristotle's account of voluntary actions.

[41] One qualification: Aristotle argues that in an important sense all cases of locomotion including all cases of voluntary self-locomotion occur only by pulling (ἕλξις) and/or pushing (ὦσις), in the sense that every – see *Physics* VII 2. But I mean 'pushing and pulling' as contrasted with more autonomous, controlled, and unpredictable self-motion. What Aristotle means in Physics VII 2 is that every process in all cases of locomotion can be reduced to something accurately described as a pushing or a pulling. Aristotle thinks that animals move themselves even if, for example, the warming and cooling of internal parts in the animal as a result of sensation, basic cognition, and desire's response to some external stimuli can be exhaustively reduced to pushing and pulling. See Corcilius and Gregoric (2013)'s 'Centralized Incoming and Outgoing Motions' model of voluntary animal self-locomotion for a wonderfully detailed and textually alert discussion of these and other features of Aristotle's relevant views.

soul, the source of life, ought to take this as one of its primary foci. Second, as *De Anima* I shows that Aristotle was well aware, several of Aristotle's predecessors including Plato took the capacity for self-motion as one of the key distinguishing features of life. In Plato's *Phaedrus* 245c1-246e2, Socrates describes the soul as a self-moving thing and an imperishable, ungenerated source of motion for all other moved things. Socrates argues that since it's clear that things with souls (such as human beings) have internal sources of motion, whereas things without souls (such as sticks and stones are moved by something outside them, what it is to be a soul is at least in part to be something capable of self-motion.[42] In Plato's *Laws* X.896a-897d the Athenian Stranger reaffirms the claim that the soul is a source of motion, connects life with the capacity for self-motion (though surely what is meant here is that the souls of *animals* – rather than all living things including plants – are capable of self-motion), and argues that of all the ten kinds of motion discussed self-motion must be the first.

When Aristotle asks in *De Anima* III 9, 'is the source of the capacity for voluntary self-locomotion one of the parts of the soul already mentioned and familiar to us at this stage, or is it some other part?' he has in mind here the parts of the soul that have been described in detail earlier on in *De Anima*, including: (1) the nutritive capacity that gives plants and animals the ability to grow and reproduce (discussed in general terms in II 1-3 but in more detail in II 4); (2) the sensitive capacity that gives animals some or all of the five senses, namely, sight, hearing, smelling, touch, and taste (discussed in great detail, along with each of the five senses throughout II 5-III 3); (3) the desiring or appetitive capacity possessed by most animals (discussed in II 3 and III 7); (4) *phantasia,* present in all animals that have sensation and usually translated 'imagination' though often left merely transliterated due to the difficulty of finding an accurate translation (for which the locus

[42] For more careful analyses of this passage see Bett (1986: 3) and Blyth (1996: 196f.).

classicus is III 3);[43] and (5) the reasoning, thinking, or intellective capacity (discussed throughout III 3-8, especially in comparison with sensation and *phantasia*).

But Aristotle might also have in mind Plato's divisions of the soul, and a simpler, more common division of the soul. For he says, immediately after stating the question described above, that we straightaway (εὐθὺς) encounter a difficulty (ἀπορίαν) 'concerning both how one ought to speak of the parts of the soul and how many [πόσα] there are' (III 9.432a23). In a sense, Aristotle says, there seem to be (φαίνεται) infinitely many (ἄπειρα) parts rather than merely (οὐ μόνον), as some say, the rational (λογιστικὸν) and the spirited (καὶ θυμικὸν) and the appetitive (καὶ ἐπιθυμητικόν) parts or, as others say, simply the rational (τὸ λόγον) and the irrational (τὸ ἄλογον) parts (III 9.432a24-26). For relative to the differences (κατὰ γὰρ τὰς διαφορὰς) by which those parts are divided (χωρίζουσι) from one another, the capacities and parts of the soul Aristotle has brought up and examined earlier on in *De Anima* (just mentioned, namely, the nutritive, sensitive, *phantasia* or image-forming, desiring, and intellective) seem to differ much more from each other and from parts such as the rational, irrational, and spirited parts (III 9.432a25-30). Presumably, Aristotle does not mean that there would genuinely be an infinite number of parts of the soul. If he does, he

[43] Everyone knows that 'imagination' is the conventional English translation of Aristotle's Greek, φαντασία, and everyone knows that this is not an ideally accurate translation. But no one seems to know how to translate *phantasia* more accurately in English. Aristotle tells us in the *Rhetoric* that *phantasia* is "a weak sort of perception" (I 11.1370a28-29), and in his extant work on dreams he says that *phantasia* is the same thing as perception, though they differ in their being (*De insomniis* 459a16-21). In *De Anima* III 3.3, a notoriously difficult text, Aristotle argues that *phantasia* is the capacity responsible for producing images, but he also argues that *phantasia* explains appearances. The ordinary sense of "imagination" is something like the faculty of forming new ideas, images, or concepts of things not present to the senses; or, more generally, the ability of the mind to be creative or resourceful. That does not sound like what Aristotle has in mind for the functions of *phantasia*. Now, one might argue: Neither φαντασία nor its transliteration is an English word. 'Imagination' might not be ideally accurate, but I do not see how it is at all illuminating to use φαντασία or *phantasia* without any translation. A semi-accurate translation is better than no translation at all. But one might also argue: a transliteration without any English translation at all is less misleading than a semi-accurate English translation that misleads readers quite a bit. I'll leave φαντασία transliterated but untranslated, as is done, for example, in Caston (1996), Moss (2012) and Scheiter (2012).

gives nowhere near enough evidence for this claim. Instead, he probably means that there would be generated an unmanageably and implausibly large number of parts of the soul.

While Aristotle does not mention Plato by name, we can be virtually certain that this division into the rational, spirited, and appetitive parts is a reference to Plato's division of the soul (*Rep*. IV 439-441c3.). As to the latter and much simpler division of the soul into the rational and irrational parts, Aristotle's *Magna Moralia* ascribes this division to Plato (1182a23-25).[44] But as Aristotle's *Nicomachean Ethics* (1102a26-28) claims, the division into rational and irrational is probably a popular way of dividing up and classifying the parts of the soul. This makes a good deal of sense; it's easy and natural to say that there seem to be within the non-physical parts of us some reasoning, rational element and some non-reasoning, irrational element. Even today, we often speak this way; we speak of a part of us that is rational, sensible, and balanced, in contrast to a separate part of us that is irrational, often unbalanced, and erratic. We also often speak of implications of this division. Some people seem to be guided more by reason than more erratic, irrational forces within them. In other people, the opposite is the case. In still others, the two elements seem often in tension with one another.

In general, when Aristotle states a problem or *aporia* (ἀπορία), this means that his discussion is supposed to solve that problem. It's a desideratum particular to that discussion – I say 'particular to' because many desiderata (things that are needed), such as not babbling, not plagiarizing, and not insulting one's audience are desiderata for any discussion. It appears

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[44] Plato is famously credited with advancing and applying the three-part division of the soul into the spirited, rational, and appetitive parts. But this does not entail that Plato rejects the simpler division of the soul into just two parts; in the *Timaeus* 69c-70b, Plato seems to view the three-part and two-part ways of dividing the parts of the soul as complimenting one another rather than in competition with one another. So it might well be the case that both *Magna Moralia* 1182a23-25 and *Nicomachean Ethics* 1102a26-28 are correct. None of this endangers the claim that the two-part classification was also (perhaps even quite a while before Plato) a popular way of dividing up the parts of the soul.

that the whole of III 9's attempt to answer the question 'what is the source of animals' capacity for self-locomotion?' is couched in the context of an *aporia* with not only a reference to Plato and thus some historical significance, but also a good deal of philosophical importance: 'if one is going to posit separate parts of the soul [εἴ τις θήσει κεχωρισμένα μόρια τῆς ψυχῆς]' then what do we say about faculties and capacities such as: (1) the nutritive faculty belonging to plants and all animals,[45] (2) the perceptual or sensitive faculty which seems neither rational nor irrational, (3) *phantasia* which differs from all of the customarily acknowledged parts and is not easily classified as rational or as irrational, and which allows animals to form internal images or pictures or imaginings of external objects usually perceived through sight, hearing, smell, touch or taste; and (4) the desiring faculty which seems to originate in part in the rational part of the soul (since wish, ἡ βούλησις, comes to be in the rational faculty) but also in part in the irrational faculty (with respect to appetite and spirit, ἡ ἐπιθυμία καὶ ὁ θυμός), so that desire would seem to be in each of the three parts of the soul in Plato's division, namely, the spirited, rational, and irrational parts of the soul (III 9.432a26-432b7).

Though 'aporia' (ἀπορία) is in the singular here, there seem to be at least three distinct problems, each with its own desideratum, that Aristotle is keenly interested in addressing. So we would do well to keep these desiderata in mind during his ensuing search in III 9 (and III 10) for the source in the soul of many animals' capacity to engage in self-locomotion:

Number of parts: If one is going to posit separate parts of the soul (εἴ τις θήσει κεχωρισμένα μόρια τῆς ψυχῆς), how can one be sure to restrict the number of those separate parts in a

[45] Aristotle says nothing in the text of *De Anima* III 9 about whether it would be difficult (or not difficult) to characterize the nutritive faculty of the soul as rational or irrational. But presumably he thinks that it would be difficult to characterize the nutritive capacity under the classification of soul parts traditionally given.

manageable way, so that the generated parts do not appear practically infinite (ἄπειρα φαίνεται)?[46] That's tricky. For there seem to be many capacities possessed by animals and/or plants that are not adequately explained by the customarily mentioned parts, namely, the rational, irrational, and spirited parts. More generally, there just seem to be a great many capacities in general, and if the distinctions are too finely carved then we'll quickly find that there are more parts of the soul than we know what to do with. We can accurately and somewhat anachronistically consider *Number* something like 'ontological parsimony'; that is, don't posit that there exist more parts of the soul than are absolutely necessary to explain what needs to be explained.

Joint exhaustiveness of parts: If one is going to posit separate parts of the soul (εἴ τις θήσει κεχωρισμένα μόρια τῆς ψυχῆς), how can one be sure that the collection of those parts explains everything that we want to explain with respect to all of the capacities of all soul-having, living things, namely, all plants and all animals? This is not an easy question to answer. Even a cursory glance at Aristotle's biological works and, for that matter, Theophrastus's works in botany show that living things have a great many markedly different and, in some cases complex capacities, and it's difficult to see how to explain all of those markedly different and complex capacities with a limited number of parts of the soul.[47]

[46] Johansen (2012: 258) prefers 'indefinite' rather than the standard 'infinite' as a translation of *apeira* in this specific passage in III.9. Johansen writes, 'One could translate *apeira* as 'infinite'. But 'indefinite' seems better in that the point seems to be that the predecessors' way of dividing the soul offers no definite limit to how many one could thus divide rather than that the parts they divide will actually be infinitely many.' This is an interesting and no doubt plausible way to deal with the two facts that (1) *apeira* is normally translated 'infinite', and (2) in this passage read in context, Aristotle almost certainly does not mean that the parts really would be infinite. In contrast, Polansky (2007: 503) argues that Aristotle's claim that the parts of the soul would 'appear unlimitedly many' if we divide them up too finely such as by functions is 'no casual comment. Since the operations of ensouled beings seem limitless, the division into parts of soul pertaining to these operations could be quite varied. Consider the number of emotions that are possible for animals, and especially humans. There are the potentiality for anger, potentiality for envy, potentiality for fear, and so on, perhaps endlessly (see Plato's *Theaetetus* 156b). And if there is a potentiality for locomotion, might this not divide into potentialities for all the various sorts of locomotions: walking, running, skipping, jumping, swimming, flying, and so o? For someone seeking to make such divisions, even just the potentiality for walking becomes unlimited since it embraces the potentiality to walk unlimitedly many magnitudes…' I am skeptical of Polansky's inference from (a) Aristotle's claim about unlimitedly many parts of the soul does not seem to be a casual comment, and there appear to be a great many capacities ensouled beings are capable of, to (b) ensouled beings are capable of infinitely many functions, and Aristotle's comment must be taken literally. Even if Polansky is correct, though, it seems to me that we can stick with the standard translation of *apeira,* and simply maintain that Aristotle intends it to be understood idiomatically, something like the way we often say in English, 'the list of chores I have to do today appears endless'. When I say that, I don't mean that for every quantity of chores that I have to do there is always a further chore yet to do. I mean, rather, that the amount of chores is finite but still seems overwhelming and unmanageable. Four hundred trillion parts is a finite number of parts. But four hundred trillion capacities is also obviously an unmanageably large number of parts.

[47] On what Corcilius and Gregoric (2010: 82-83) call 'the standard view' of Aristotle's account of parts and capacities of the soul, something is a part of the soul *iff* it is a capacity of the soul. C&G say that Barnes (1971-2: 101-114 at 105), Polansky (2007: 8), and Sorabji (1974: 63-89 at 64) adopt this view. C&G argue against the standard view. In particular, they argue against the right-to-left of that bi-conditional: in passages such as *De Anima* III 10 433b1-4, Aristotle seems to say that it's wrong to think that any capacity at all can (let alone must) be a distinct part of the soul. Aristotle might well be fine with – and indeed a big supporter of – the left-to-right, though: if something is a part of the soul then it is a capacity of the soul. So C&G think that for Aristotle there is some non-trivial distinction between a part of the soul and a capacity of the soul. It seems to me that considering the relation between *Number, Mutual Exclusivity,* and *Joint Exhaustiveness* is a useful way of getting clearer on the distinctions between the competing interpretations of Aristotle's account, as well

Mutual exclusivity of parts: If one is going to posit separate parts of the soul (εἴ τις θήσει κεχωρισμένα μόρια τῆς ψυχῆς), how can one be sure that each of those parts of the soul are completely separated (κεχωρισμένα), or at least separate enough to call them distinct parts of the soul?[48] That's tricky too. For faculties such as desire seem to originate in both the irrational and the rational parts of the soul.[49] And, as *De Anima* III 9's inquiry seems to show, no part of the soul functioning entirely on its own seems adequate as an explanation for capacities such as most animals' capacity for voluntary self-locomotion.

Solving any one of these problems alone is straightforward. But solving all three of them together, and in some cases even just two of them together is more difficult.[50] For example: it would be much easier to solve *Number* if one did not also have to solve *Joint exhaustiveness* and, conversely, it would be much easier to solve *Joint exhaustiveness* if one did not also have to solve *Number*. For example, solving *Number* would be much easier if one did not have to also worry about also solving *Joint exhaustiveness*. For Aristotle could just stick to the usual two or three parts of the soul customarily acknowledged if he did not have to worry about

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as which account is most accurate. It's not clear to me, for example, that any of Barnes, Polansky, or Sorabji would endorse the claim that for Aristotle if anything is a capacity of the soul then it is a part of the soul, assuming that *Mutual Exclusivity* must be granted (each capacity maps onto only one part), mainly because *Number* would obviously not be satisfied. Whiting (2002) assumes that τὸ αἰσθητικόν, τὸ φανταστικόν, τὸ ὀρεκτικόν each contain more than one non-trivially distinct semantic interpretation without clarity as to which is the intended or correct interpretation in context. That is, they're each ambiguous. They might refer to the capacities of the soul by which animals respectively sense, imagine, and desire; or they might refer to the parts of the soul with which an animal does these things. So, in effect, Whiting seems to assume that the standard view Corcilius and Gregoric (2010) attack is at least questionable if not false.

[48] Besides making clear that he doesn't mean material or physical separateness, Aristotle isn't very clear on what sense of 'separateness' he has in mind here. But the sense he seems to take as especially if not solely relevant is that of function and, in particular, role as a source of living things' capacities. This implies a further distinction and separation in the account (in the *logos*) of the part of the soul from other parts. But it does not imply separability in place, in any sense of spatial separability. As is noted in Whiting (2002: 150 n.11), Plato's *Timaeus* advocates locally separable parts of the soul. But Aristotle appears to think that this cannot be right, in large part because it would undermine the unity of the soul (cf. *De Anima* I 5.411b5-14). What I am especially interested in here, though, is the extent to which Aristotle thinks that unlike capacities such as sight, smell, taste, hearing, higher thinking, growth, decay, choosing something over the object of desire, reproductive capacities, taking in nutrition, and dreaming, the capacity for voluntary self-locomotion seems to require more than one faculty of the soul in a non-trivial way. By 'non-trivial' I mean not just a mere necessary condition that does not play an important role; I mean that the faculty in question plays an important role in the use of the given capacity.

[49] Aristotle distinguishes between the different kinds of desire at *De Anima* 413b16 and 414a32. These distinctions are echoed at *Nicomachean Ethics* 1111b10ff., *Politics* 1334b23, and *Rhetoric* 1369a1ff.

[50] It wasn't just Aristotle and Plato who disagreed about how to correctly divide up the parts of the soul, and about what is a part of the soul and what is a capacity of the soul: 'The ancients are divided …about the parts of the soul, and in general what is a part and what is a capacity, and wherein their difference lies' (Stobaeus 1. 49. 25a = Porphyry fr. 253 Smith).

that collection of posited parts adequately explaining every capacity possessed by living things. He could posit the rational and irrational parts of the soul, and not worry that a capacity of animals, such as *phantasia*, the internal image or picture-making faculty, seems to be neither rational nor irrational. But in Aristotle's view, *phantasia* (among other faculties) is neither strictly speaking rational nor strictly speaking irrational, and thus presents a big problem for *Joint exhaustiveness* if only the irrational and rational parts of the soul are posited.[51]

On my reading, Aristotle's *De Anima* III 9 and III 10 try to show that satisfying *Number* and *Joint exhaustiveness* might well come at the cost of realistically softening *Mutual exclusivity*. For in III 9, Aristotle considers as a candidate answer to the question 'what part of the soul gives most animals the ability to engage in voluntary self-locomotion; what is the mover (τὸ κινοῦν), the source in the souls of animals when they self-move?' each thus far acknowledged part of the soul functioning entirely on its own. Aristotle argues against the nutritive, sensitive, desiring, and reasoning faculties as candidates, as I explain in detail in Section 2. Aristotle certainly wants to preserve *Joint exhaustiveness* – that desideratum is

[51] Conversely, solving *Joint exhaustiveness* would be much easier if one did not also have to worry about also solving *Number*. A proof: take every token of an activity or capacity described in the totality of Aristotle's empirical observations concerning animals. Throw in the totality of Theophrastus's empirical observations concerning plants. Assign each of those tokens a distinct part of the soul, each named by one, only one, and a distinct natural number (1,2,3, …). Many thousands of parts of the soul would be generated. Everything that the father of biology (namely, Aristotle) and the father of botany (namely, Theophrastus) took living things to be capable of would be adequately explained by each of those distinct parts of the soul. So *Joint exhaustiveness* would be satisfied. But *Number* would obviously not be satisfied: we wouldn't have infinitely many parts but we would certainly have an unmanageable number of parts.

Mutual exclusivity would be easy to satisfy if one did not also have to satisfy *Number*. For one could posit a new part of the soul for every capacity that seems to require more than two or more parts of the soul to work in conjunction. But such an ontological strategy would soon falsify *Number*. *Mutual exclusivity* would be trivial to satisfy if one did not also have to satisfy *Joint exhaustiveness*. For one could posit just two parts (or even just one part) – for instance, a nutritive part and an intellective part – guaranteed to be separate but which have no chance of adequately explaining anything like the entirety of living things' capacities. Evidently, Aristotle thinks that Plato's classification of the soul satisfies neither *Joint exhaustiveness* (due to the three parts' inability to account for common capacities such as *phantasia*) nor *Mutual exclusivity* (due to capacities such as desire being in both the irrational and the appetitive, irrational part), even if Plato's classification neatly satisfies *Number* and makes a better attempt than does the popular classification at satisfying *Mutual exclusivity* and *Joint exhaustiveness*.

precisely why he's bothering to find the source of self-motion in the soul. Further, positing a further part of the soul just to explain self-motion would seem both ad hoc and potentially a threat to *Number*.

So, in III 10, (as I explore in Section 3), Aristotle opts not to add more soul-parts to his ontology and metaphysics but, instead, to argue that in an important and function-oriented sense, some of the parts of the soul are not mutually exclusive. Aristotle argues that voluntary self-locomotion has its source in the soul's faculty of desire always functioning together with forms of cognition including *phantasia* and practical *nous*. This reading sits well not just with III 9-10's inquiry but also with Aristotle's expressing some uneasiness about talking of parts of the soul in other passages such as *De Anima* I 5.411b5-14, *De Anima* II 2.413b11-16, and *De Juv.* I 467b16-18. Consider the first:

To be sure, some say that the soul has parts and that reasoning is by means of one part and desiring by means of another. What, then, holds the soul together, if it naturally has parts? For it is surely not the body; on the contrary, the soul seems rather to hold the body together. At any rate, when the soul has departed, the body disintegrates and putrefies. If, then, something else makes the soul one, that, more than anything else, would be soul; and then one will again need to inquire whether it is one or many-parted. For if it is one, why will the soul too not be one straightaway? If it has parts, the argument will once again inquire into what it is which holds it together, and thus it will proceed ad infinitum (*De Anima* I 5.411b4-14).

By softening *Mutual exclusivity*, by showing that for functions as fundamental and wide-ranging as the capacity of (human and non-human) animals to move themselves the parts of the soul crucially work together rather than in isolation, Aristotle's account can go some way towards maintaining both that the soul has distinct parts and that the soul is unified.[52] He can do so without positing an extra, unifying entity on top of the basic parts of the soul. Though non-identical in their accounts and functions, the parts of the soul do in some vital

[52] I say 'softening' rather than 'falsifying' or 'failing to satisfy' because Aristotle often speaks of parts of the soul in advancing his own account of the soul (see, for instance, *De Anima* II 2.413b7, 27; III 4.429a10; *Parts of Animals* I 1.641a32-b10; and, more generally, the way Aristotle sets out his own account of the soul and its faculties throughout *De Anima* II and III).

ways work in a unified way. My reading eases the tension between III 9's arguing that neither *nous* nor desire is the source of voluntary self-locomotion and III 10's arguing that desire and *nous* are both the source. Not only does Aristotle reject desire and *nous* in much weaker terms (neither can be the authority or control, κυρία) than those in which he rejects the nutritive and sensitive capacities (neither can be the mover, τὸ κινοῦν), but, in addition, he aims to show that *Joint exhaustiveness* cannot be satisfied if a maximally strong sense of *Mutual exclusivity* must also be satisfied.

II. NO SOUL-FACULTY FUNCTIONING ENTIRELY ON ITS OWN CAN BE THE SOURCE OF THE CAPACITY FOR SELF-MOTION

Aristotle's first candidate for the source of the capacity for voluntary self-locomotion in the souls of animals is the nutritive faculty (ἡ θρεπτικὴ δύναμις) alone (III 9.432b14-15, cf. I 4). This is the part of the soul that is common to all plants and animals. It allows living things to take in nutrition, grow, decay, and reproduce. This sort of change (κίνησις) is necessarily in all living things (III 9.432b9-11). Aristotle sometimes uses 'change' (κίνησις) in a broad sense to include changes in quality, changes in quantity (growth and decay, increase and decrease), changes in place (locomotion), and even changes in substance (coming to be and ceasing to be) – see, for example, *Physics* V 1. Since the nutritive capacity is the only part of the soul that is and indeed must be in every living thing (for plants have only the nutritive capacity but no other capacity of the soul, not even sensation), and since locomotion is a kind of change, one might think that the nutritive capacity is the source of self-motion in the souls of self-moving animals. One might think that the nutritive capacity is the most obvious candidate for a necessary (if not also a sufficient) condition for the source of self-motion in animals' souls.

Aristotle gives two main reasons why the nutritive capacity clearly (δῆλον) cannot be the source of self-motion in the souls of self-movers. First, this kind of change, locomotion (voluntary change in place), is always directed towards some end (ἀεί τε γὰρ ἕνεκά του ἡ κίνησις αὕτη), toward some object of pleasure or away from some object of pain (III 9.432b15). Nothing moves unless it's going toward or fleeing away from something or being forced to move (οὐθὲν γὰρ μὴ ὀρεγόμενον ἢ φεῦγον κινεῖται ἀλλ' ἢ βίᾳ) (III 9.432b17-18). All locomotion is accompanied by *phantasia* and desire (III 9.432b16). Yet (implied though not made explicit in the argument) the nutritive capacity is neither accompanied by *phantasia* and desire, nor is it always directed toward some object of pleasure or away from some object of pain Second, plants have the vegetative capacity of soul. So if the vegetative capacity were responsible for locomotion then plants would move about and would have the tools necessary to do so. But (implicit premise:) plants don't move about and they don't have the tools necessary to do so (*De An*. III 9.432b17-19).

Nor, argues Aristotle, is the mover in a self-mover's soul the faculty of sensation (τὸ αἰσθητικόν), the faculty had only by animals and by which animals see, smell, hear, feel, and taste (III 9.432b19, cf. II 5-12, III 1-3). Though Aristotle does not give any reasons to think so, one might think that the faculty of sensation is not just a necessary condition for self-motion (since it's possessed by all animals and only animals can engage in self-locomotion) but also is a key factor in self-motion. After all, it is usually hearing or smelling or touching or seeing or tasting some object that tells an animal whether an object is desirable or not, and whether it should be pursued or avoided. But Aristotle points out that there are many animals that have sensation but which are stationary and motionless all their lives, and which lack the tools necessary for the capacity of locomotion (*De An*. III 9.432b20-21). He presumably has in mind animals such as sea squirts (τήθυα, ascidians) and a species of sea

anemone – see, for example, *Historia Animalium* IV.6.531a8-35. Nature never does or creates or gives anything in vain or without a purpose; nor does nature ever leave out anything necessary (ἡ φύσις μήτε ποιεῖ μάτην μηθὲν μήτε ἀπολείπει τι τῶν ἀναγκαίων) (III 9.432b21-22). These are like axioms for Aristotle.[53] If the sensitive faculty were responsible for locomotion then all animals that have sensation, including stationary animals, would require locomotion for their survival and reproductive success. But stationary animals, which have sensation, do not need locomotion for their survival or reproductive success. Or, to put the matter in a different way, if stationary animals needed locomotion to survive then nature would give them a capacity necessary for locomotion; but nature gave them only the nutritive and sensitive capacities (*De An.* III 9.432b19-26).

Might the source of self-motion be the intellective, calculating faculty or what is called reason or *nous* in the soul (τὸ λογιστικὸν καὶ ὁ καλούμενος νοῦς) (III 9.432b26)? While, again, Aristotle does not give any reasons to think that reason is mover in the souls of self-movers, one might think that reason is a plausible candidate. For it seems that many cases of self-motion in human and non-human animals are started and sustained by the faculty of reason. Animals, including human beings, often move toward food or away from danger. But animals also often move for more complex reasons.[54] Human beings move toward building supplies in order to build a home. We then move around constructing all sorts of dwellings for ourselves. Aristotle was well aware that non-human animals often

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[53] For Aristotle, it is difficult to overstate the importance of the generalization that everything has a purpose or end (τέλος, *telos*) as well as an explanation or cause, and that the purpose of a thing and the explanation or cause (αἰτία, aitia) of a thing – including its *final* cause or purpose – are crucial to understand the differences between things. See for example *NE* I.1.1094a1-3, *Phys.*II.2.194a29-31, *Pol.*I.2.1253a10, *Phys.*II.7.198a25, *Pol.*1.1.1252a1-3, *PA.*II.17.660b6-7, *Metaph.*α.2.994b13-14, *Phys.*II.3.194b32-33, and *Phys.*II.3.194b18. In general, while there are disagreements as to the precise sense in which some of these claims ought to be understood (see Johnson (2005), for example), Aristotle is very faithfully attached to the idea that everything in nature has a purpose, and in particular, a purpose closely tied to the thing's explanation or cause.

[54] As another example, Aristotle seems impressed by the art, skill, cunning, and industry of spiders (*HA* IX.39.623a8-24).

move for similar reasons: 'Some creatures provide themselves with a dwelling…the mole, the mouse, the ant, the bee' (*Historia Animalium* I.1.488a20-21). Take birds, for example. Aristotle notes that in building a nest, the swallow does something remarkably similar to what human beings do: 'It mixes mud and chaff together; if it runs short of mud, it souses its body in water and rolls about in the dust with wet feathers; furthermore, just as man does, it makes a bed of straw, putting hard material below for a foundation, and adapting all to suit its own size' (*Hist. Anim*. IX.6.612b22-26). Aristotle reports this as a nice example of a way in which the lives of animals resemble human life. He praises the swallow for its acute intelligence in activities such as nest-building and rearing its young. And he tells us, 'ring-doves and turtle-doves always build their nests in the same place year after year' (*Hist. Anim*.IX.7.613a24-25).[55]

Nevertheless, Aristotle gives four arguments against thinking that the reasoning faculty is the source of motion in self-movers' souls. First, reason is not concerned with what is practicable. Reason isn't concerned with what ought to be pursued or what ought to be avoided. Yet self-locomotion is concerned exclusively with what ought to be pursued or what ought to be avoided (*De Anima* III 9.432b26-28). Superficially, this might seem an implausible argument. Many things such as billiard balls are capable of locomotion but they don't do so with the intent to pursue or avoid. But I think it's quite clear that Aristotle would argue that such cases of locomotion are not cases of *self*-locomotion. Aristotle is interested in cases in which the motion and the ability to stop the motion both seem to originate primarily from the thing (the animal) itself, as opposed to locomotion that occurs primarily as a result

[55] For some other examples, see *HA* IX.11.614b31-32, IX.11.615a4-14, IX.12.615b20-22, IX.13.616a5-6, IX.15.616b1, IX.14.616a15-25, and IX.10.614b19-23. By Aristotle's many descriptions, non-human animals such as birds seem to be capable of self-motion that is not stimulated by anything remotely as simple as the presence of a mate, danger, or food.

of something other than the mover such as a case of an inanimate object struck with enough force to move it from one place to another.[56]

Second, Aristotle argues that when the faculty of reason does consider some object that it thinks ought to be pursued or some object that it thinks ought to be avoided, it does not produce the immediate, corresponding fear (of the object that it thinks ought to be avoided, or presumably the corresponding immediate physical fleeing from that object), nor does it produce the immediate, corresponding desire for pleasure (for the object that it thinks ought to be pursued, or presumably the corresponding immediate physical pursuit of that object). For example, reason is capable of conducting cost benefit analyses. While considering the especially severe costs of a potential action, reason might produce some fear in the person but without that person immediately acting on that fear or having the kind of fear that causes immediate motion. The same applies to especially attractive, expected benefits of a potential action (III 9.432b28-433a1). Aristotle seems to have in mind here an implicit contrast with the faculty of desire. He seems to think that if the faculty of reason and the faculty of desire were to have what seems to be one and the same object of consideration, and if that object were something the animal fears, then reason would not cause immediate action whereas desire would in most cases cause immediate action. Take, for instance, the following two cases:

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[56] Another way of casting this distinction is between (1) locomotion and (2) change in place, rather than between (1) locomotion and (3) self-locomotion. Translations often translate both κίνησιν κατὰ τόπον and φορά as locomotion in Aristotle. But κίνησιν κατὰ τόπον literally means 'change in place', not locomotion. And even if Aristotle often appears to conflate these concepts in works such as his *Physics* and *De Anima*, it is important to note that they do come apart in non-trivial ways. For it seems that X can change in place without X engaging in what we would normally call 'locomotion'. More precisely, it seems that all cases of locomotion are cases of changes in place but not all cases of changes in place are cases of locomotion. Right now I am on a planet hurtling around the sun. So in that sense I am changing in place as the earth moves even when my location on the earth remains fixed. But locomotion is a power or ability to move from one place to another. It is not in my power to move the earth around the sun or to stop the earth moving around the sun. So I am not engaging in locomotion as I move around the sun. But whenever I engage in locomotion, using my ability to move from one place to another, I am changing in place.

The faculty of reason working in a person trapped in an elevator: Suppose that a rational agent, S, is currently trapped in an elevator and believes this to be the case. Suppose that S has some claustrophobia and a higher-than-average level of anxiety. Further, suppose that S applies her faculty of reason rather than her faculty of desire to her situation. Aristotle seems to think that S's faculty of reason would not command being afraid (οὐ κελεύει δὲ φοβεῖσθαι) even though S's faculty of reason is considering something of which S is generally very afraid. Though the heart might be moved (ἡ καρδία κινεῖται), S does not panic or experience an immediate impulse to bang on the elevator doors and/or start shouting for help. Instead, S might calmly consider S's options in the situation.

The faculty of desire working in a person trapped in an elevator: Suppose that a rational agent, S, is currently trapped in an elevator and believes this to be the case. Suppose that S has some claustrophobia and a higher-than-average level of anxiety. Further, suppose that S applies her faculty of desire rather than her faculty of reason to her situation. Aristotle seems to think that S's faculty of desire would command being afraid (κελεύει φοβεῖσθαι), such as commanding S to panic, experience an immediate impulse to bang on the elevator doors, and/or start shouting for help.

If this is correct as an interpretation of the relevant distinction Aristotle has in mind, then it is an interesting insight into his view of moral psychology and the causes of our actions. More saliently, this distinction tells us just how cleanly Aristotle sees the cut between the faculty of desire and the faculty of reason. So it helps us to get a good deal clearer on how Aristotle seems to understand at least part of *Mutual exclusivity*. That the function of one part of the soul is mutually exclusive from the function of another seems to entail, for Aristotle, that in a certain domain and given one and the same object, that object can be considered by both parts simultaneously in the same context, and one part might produce impulses and/or actions diametrically opposed to the impulses and/or actions produced by the other part. This does not entail, of course, that Aristotle is committed to the much stronger view that across every single domain in every context and any object, those parts will function in diametrically opposed (or even different) ways.

Aristotle's third argument against the claim that *nous* or reason is the source of voluntary self-locomotion notes that there are cases in which the soul moves according to desire even though the faculty of reason gives a contrary command. In an *akratic* (a person

without adequate self-control such that they do not do what they justifiably believe they should do), for example, his faculty of reason might say something like 'eat the salad, not the cake' and his desire might say 'eat the cake, not the salad'; such a person would move according to desire rather than according to reason (III 9.433a2-4). This shows that there are some common cases – for there seem to be many cases of *akrasia* among human beings – where the source of self-motion is not in the faculty of reason but, rather, in the faculty of desire. Yet – though Aristotle leaves this part of the argument implicit – if the faculty of reason were the source of self-motion in the souls of self-movers then we would expect that in all or at least most cases of conflicts between the dictate of reason and the dictate of desire, the dictate of reason would win out. So it seems that the faculty of reason is not the source of self-motion in self-movers.

Fourth, Aristotle argues that we see in general that a person who has knowledge (stored in the intellect) of a specific craft or skill or art does not necessarily practice that craft or skill or art or engage in the corresponding locomotion. So it seems that the impetus for actually practicing, actually moving according to the craft or skill or art belongs not to the faculty of reason but to some other faculty or faculties of the soul. Aristotle uses one of his favorite examples here, the art of medicine and the doctor: 'the one with medical knowledge [ὁ ἔχων τὴν ἰατρικὴν] does not heal [οὐκ ἰᾶται], there being something else – not his knowledge – in charge of his acting in accordance with his knowledge' (*De An*. III 9.433a4-6). Presumably, Aristotle means not the obviously far-fetched claim that the one with medical knowledge does not heal (οὐκ ἰᾶται), but rather the reasonable and relevant claim that the one with medical knowledge does not necessarily heal (οὐκ ἀνάγκη ἰᾶται). We see plenty of doctors healing – Aristotle saw his father, a doctor, healing. What Aristotle must mean, rather, is that it's not the case that people with medical knowledge heal solely because

they have medical knowledge. Rather, they heal both because they have knowledge – that's a necessary condition for (intentional) healing – but also and more importantly because of some source(s) of motion with them. The mover (τὸ κινοῦν) in the person with medical knowledge, the thing that commands (κελεύει) that the person use their knowledge is something other than the knowledge itself contained in the person's faculty of reason. These cases do not seem implausible or uncommon. So Aristotle concludes that it is 'as if [ὡς] there is something else [ἑτέρου τινὸς] – not his knowledge [ἀλλ' οὐ τῆς ἐπιστήμης] – in charge of [κυρίου] his acting in accordance with his knowledge [ὄντος τοῦ ποιεῖν κατὰ τὴν ἐπιστήμην]' (III 9.433a4-6).[57]

Finally, Aristotle turns to consider desire (ἡ ὄρεξις) as a candidate for the source of self-motion in animals' souls (III 9.433a7). In contrast with his introduction of his discussion in III 9, where he spoke merely of 'the mover' (τὸ κινοῦν) in the souls of self-moving animals, Aristotle seems now to be searching for what is in charge of (κυρίου) self-motion, what is the power or authority or control (κυρία) in the souls of self-moving animals, what is the master (κύριος) of it, what commands it (κελεύει), what is decisive or what is dominant in the animal's soul. The language later on in III 9 becomes stronger and much more causal in that respect. Aristotle begins with a search announced as 'what is it that initiates an animal's locomotion' (τί τὸ κινοῦν κατὰ τόπον τὸ ζῷόν ἐστιν) (III 9.432b8-9, cf. III 9.433a2, 433a5) and carried out in those terms in Aristotle's arguing against the nutritive faculty and the sensitive faculty as candidates for the source of self-motion in animals' souls. But in the latter stages of Aristotle's discussion of reason and desire as candidates, he argues that the faculty in question is not the power or authority (κυρία) in the soul with respect to

[57] There is a more direct version of this argument in *PA* I 1.641b7-9.

self-motion in animals. He does not, for example, argue that desire is not the mover (τὸ κινοῦν) but, instead, that desire is not 'in charge of this motion [κυρία τῆς κινήσεως]' (III 9.433a7). Though Aristotle seems to be exclusively interested in III 9 eliminating candidates, it might be quite a different matter to eliminate a candidate for being (a) the mover in the soul of self-moving animals, as opposed to (b) the control, authority, commander, power, or what's in charge in the soul of self-moving animals. Arguing that a faculty isn't (b) does not seem to entail that the faculty isn't (a). I could reasonably say that I do in a sense move my chair without saying or implying that I am in charge of my chair's motion. So we might well read Aristotle's arguments against the nutritive and sensitive faculties as having stronger conclusions than his arguments against reason and desire.

Aristotle's argument against the faculty of desire's being in charge of self-motion is succinct – much shorter than his discussion of the nutritive, sensitive, and reasoning faculties as candidates for the source of voluntary self-locomotion. We see that the *enkratic*, a person with adequate self-control such that she does what she justifiably believes that she should do, acts according to reason rather than desire. Such a person acts according to reason even if their desire gives them a contrary and otherwise compelling command. Even if desire says, for example, 'eat cake', the enkratic will eat salad if her reason says to eat salad (*De An*. III 9. 433a6-9). Unless there are enkratic non-human animals, Aristotle uses only (some) human beings as counterexamples to the claim that desire is the capacity of the soul that gives animals the ability to engage in self-locomotion. This argument of his does not seem to apply to non-human animals. Therefore, it remains a possibility, albeit one left unmentioned in the text, that desire is the part of the soul in non-human animals that gives (most) non-human animals the ability to engage in voluntary self-locomotion.

While it's true that in III 9 Aristotle far more convincingly rules out the nutritive, sensitive, and reasoning faculties of the soul than he does the desiring faculty of the soul, and also true that Aristotle fails to rule out the imaginative faculty (*to phantastikon*), his general aim in III 9 seems quite clear: show that there isn't a faculty of the soul that is, functioning entirely on its own, the source of self-motion.[58] There seem to be two ways to proceed at this point on the assumption that Aristotle must satisfy *Number*, *Joint exhaustiveness*, and some variant of *Mutual exclusivity* strong enough to support the claim that there are indeed distinct faculties of the soul. First, he might infer that a further faculty of the soul must be introduced into his ontology and metaphysics, one that is on its own the source of self-motion. That would not appear to threaten *Mutual Exclusivity*. But one might well worry that this threatens *Number*. Second, he might infer that multiple faculties of the soul together function as the source of self-motion.[59] That wouldn't threaten *Number* but it might require softening *Mutual Exclusivity*. In *De Anima* III 10, Aristotle seems to select the second option.

III. SELF-MOTION HAS ITS SOURCE IN THE SOUL'S FACULTY OF DESIRE WORKING WITH *PHANTASIA* AND PRACTICAL *NOUS*

Strangely, having just ruled out the possibility that the faculty of desire (ὄρεξις) is the part of the soul that explains how animals move themselves from one place to another, having also argued carefully that intellect (νοῦς) cannot be that part of the soul, and without having explained why *phantasia* might be the mover, Aristotle immediately goes on to assert that desire and intellect (νοῦς) – the latter in the sense of imagination (φαντασία) – are the two movers, the two parts of the soul that explain animals' capacity for self-motion: 'It appears, then, that there are two movers, namely, desire and intellect [Φαίνεται δέ γε δύο

[58] As Polansky (2007: 504) astutely observes, III 9.432a31-b3 is the only passage in the entire treatise in which *to phantastikon* ('the imaginative faculty') is used, as opposed to just *phantasia* ('imagination').

[59] These ways might or might not come together. Perhaps all of those faculties functioning together as the source of self-motion are among those already discussed in *De Anima*, or perhaps some or all of them are novel.

ταῦτα κινοῦντα, ἢ ὄρεξις ἢ νοῦς], if imagination if taken as some kind of intellect [εἴ τις τὴν φαντασίαν τιθείη ὡς νόησίν τινα]' (*De An* III 10.433a9-10). He defends this assertion throughout *De Anima* III 10, concluding: 'In general, then [ὅλως μὲν οὖν], as we have said [ὥσπερ εἴρηται], an animal has the capacity to move itself insofar as that animal has the faculty of desire [ᾗ ὀρεκτικὸν τὸ ζῷον, ταύτῃ αὑτοῦ κινητικόν]; and desire is never without *phantasia* [ὀρεκτικὸν δὲ οὐκ ἄνευ φαντασίας]' (*De An.* III 10.433b27-29).[60]

Superficially, then, with respect to his discussion of the faculty of desire, Aristotle has blatantly contradicted himself when it comes to human beings, and he has no support for his view when it comes to non-human animals. For he has just argued, as explained above, that in the case of enkratic (self-controlled) human beings, we sometimes self-move contrary to the whims of desire; and he did not say anything about the role of desire in self-motion in non-human animals. As for the assertion that intellect – construed as *phantasia* – is the other mover in self-movers' souls: Aristotle gave four reasons (explained above) to think that the intellect cannot be the faculty that explains self-motion, and imagination was not once mentioned in the course of that discussion. Yet he goes on to defend this new view throughout *De Anima* III 10, concluding: 'In general, then [ὅλως μὲν οὖν], as we have said [ὥσπερ εἴρηται], an animal has the capacity to move itself insofar as that animal has the faculty of desire [ᾗ ὀρεκτικὸν τὸ ζῷον, ταύτῃ αὑτοῦ κινητικόν]; and desire is never without

[60] Hutchinson (1990: 8-10) argues that *De Anima* III 10 ought to end at 433b26 rather than 433b29. So his view is that III 11 ought to include the conclusion-statement quoted above; it's translated by Hutchinson, 'In general, as was said: an animal is able to move itself in virtue of being able to desire; it cannot desire without imagination; all imagination is either (a) of reason or (b) of the senses' (433b27-29). This distinction, while interesting and somewhat relevant, does not have much impact on my discussion here, For even without 433b27-29's concluding statement it is still clear from the rest of the uncontested text of *De Anima* III 10 that the view Aristotle defends and develops in III 10 is what is stated in 433b27-29 (even if 433b27-29 falls, on a more accurate reading, in III 11).

phantasia [ὀρεκτικὸν δὲ οὐκ ἄνευ φαντασίας]' (433b27-29).[61] Therefore, there seem to be not just gaping gaps in reasoning between the end of *De Anima* III 9 and the start of III 10 but, more worryingly, also tensions if not just blatant inconsistencies between *De Anima* III 9's argumentation and the view defended and developed throughout III 10.[62]

But it seems to me that these gaps and points of tension can be resolved if we consider III 10 more carefully and in the context of the following two points: first, in III 9, as I explained in the previous section, Aristotle rejects desire and *nous* in much weaker terms (neither can be the authority or control, κυρία) than those in which he rejects the nutritive and sensitive capacities (neither can be the mover, τὸ κινοῦν); and, second, all Aristotle rules out in III 9 is the possibility that any one faculty alone among the nutritive, sensitive, desiring, or reasoning faculties can be the source of voluntary self-locomotion. That is, Aristotle shows in III 9 that *Joint exhaustiveness* cannot be satisfied if a maximally strong sense of *Mutual exclusivity* must also be satisfied. But that does not entail or in any way support the claim that some combination of those faculties might be the source of self-motion. As an

[61] As I'll discuss in more detail later on, Aristotle argues that an external object of desire (τὸ ὀρεκτόν) is the unmoved mover that moves the faculty of desire (τὸ ὀρεκτικόν), which in turn moves the animal when that animal engages in self-locomotion.

[62] Shields (2016: 356-357) comments on some of the apparent tension between III 9 and III 10: 'At least initially, the chapters [III 9 and III 10] appear significantly at variance with one another regarding the faculty of desire and its role in initiating motion in animals. The bulk of III 9 was given over to distinguishing the faculty responsible for initiating motion from the acknowledged psychic faculties: it is not nutrition (432b7-19); it is not perception (432b19-25); and it is not reason (432b25-433a6). It then closed with the suggestion, advanced by relying on arguments analogous to those deployed for the case of reason, that the faculty responsible for motion could not be desire (orexis) (433a6-8). In the current chapter, however, Aristotle evidently concludes that 'there is one thing initiating motion: the faculty of desire' (orektikon; 433a21) …Further on in the chapter he reiterates, 'It is apparent, then, that what is called desire (orexis) is the sort of capacity in the soul which initiates motion' (433a31-b1).' But discussion of the tension between III 9 and III 10 is curiously absent from many otherwise careful commentaries on and analyses of this stretch of text, such as in Aquinas's commentary on *De Anima* and, more specifically, his inquiry into the principle of local movement in animals (principium motus localis in animalibus) in *De An.* III 9-10 (Lectio 14-15); in Averroes's Middle Commentary on *De Anima* (315-322); in Hamlyn (1993: 150-154); Johnson (2005: 265-271); Leunissen (2010: 70-75); Moss (2012: 17-20, 104-105, 109-11, 118-120, 138, 162); Philoponus (573.8-594.15); Richardson (1992: 381-399); Ross (1962: 310-318); Simplicius (286.22-306.27); Themistius (116.26-121.18); and Whiting (2002: 141-200). In fact, commentators such as Aquinas, Averroes, Leunissen, and Philoponus argue that Aristotle infers III 10's preliminary conclusion from III 9's arguments.

overly simplistic but straightforward example, there does not exist any one of my body parts that is on its own adequate for my capacity to run. But a collection of my body parts is adequate. And, to emphasize the first point: that my thumb isn't adequate is a good deal more obvious than, say, my legs. Desire on its own does not control voluntary self-locomotion. Nor does *nous*. But they are the most likely candidates discussed in III 9.

If desire and *nous* together do control voluntary self-locomotion, though, what sort of cognition, reasoning, intellect, or calculating is the referent of *nous*? After opening *De Anima* III 10 by stating that desire and reason (*nous*) appear to initiate motion, Aristotle explains that by *nous* he means *phantasia*, because (γὰρ): 'many [πολλοὶ] follow imaginings [ἀκολουθοῦσι ταῖς φαντασίαις] contrary to knowledge [παρὰ τὴν ἐπιστήμην], and in the other animals [ἐν τοῖς ἄλλοις ζῴοις] there is neither reasoning [οὐ νόησις] nor calculating [οὐδὲ λογισμὸς], though there is *phantasia*' (III 10.433a9-11). So by *nous* in this context, Aristotle means a form of reasoning much more basic than the higher reasoning discussed in III 9 that might a human being might use to reject an object of immediate desire due to expected negative consequences. He means reasoning possessed by not just humans but by non-human animals as well. For non-human animals must be the referent of ἄλλοις ζῴοις, especially since the preceding clause described the many who follow imagining contrary to knowledge (ἐπιστήμη). Only human beings have ἐπιστήμη, Aristotle's term for knowledge in a fairly strict sense. He tells us here, then, that non-human animals have no form of cognition, no form of calculation or reason other than *phantasia*.[63]

Aristotle means the kind of *nous* or reason 'which engages in calculation for the sake of something and is practical [ὁ ἕνεκά του λογιζόμενος καὶ ὁ πρακτικός], and which differs

[63] *De Motu Animalium* 7's description of the practical syllogism certainly seems to suggest that non-human animals engage in (at least some rudimentary kind of) decision-making processes. This view is defended in Corcilius (2008).

from the contemplative reason [διαφέρει δὲ τοῦ θεωρητικοῦ] with respect to its goal [τῷ τέλει]' (III 10.433a13-15). The contemplative type of *nous* aims merely at finding truth and acquiring knowledge. The practical type of *nous*, in contrast, always aims to bring things into being. Practical reason brings about action whereas contemplative reason brings about learning and inquiry. Practical reason and desire are in these respects complimentary and tightly intertwined: 'And desire, too, is always for the sake of something [ἕνεκά του πᾶσα], since desire is for something, and this is the starting point [ἀρχὴ] of practical reason [τοῦ πρακτικοῦ νοῦ], while its final stage [τὸ δ' ἔσχατον] is the beginning of action [ἀρχὴ τῆς πράξεως]' (III 10.433a15-18). Every desire is aimed at something. That's the principle of practical reason. The result of practical reason's calculation is the start of the action. Calculation looks for the means to achieve what desire says is the aim. The referent of τὸ ἔσχατον ('the final stage') is probably the stage at which practical reasoning, beginning from the end or goal given by desire, then applies its calculations to what is then and there in the power of practical reason (cf. *Nicomachean Ethics* III 3.1112b11-34; *Metaphysics* VII 7.1032b6-31). Aristotle is already trying to convince us that if the faculty of desire is key in initiating voluntary self-locomotion in the souls of self-moving animals, it does not function alone. Rather, desire must always be paired with practical *nous*.

So it is reasonable (εὐλόγως), Aristotle argues, that desire and practical thought (ὄρεξις καὶ διάνοια πρακτική) appear to be the movers (τὰ κινοῦντα) (*De Anima* III 10.433a18). There is, first, the object of desire (τὸ ὀρεκτὸν) (III 10.433a19). Though Aristotle does not make the following explicit, he must presuppose this: there can be no object of desire without the faculty of desire. Without desire, there would simply be an object. With the faculty of desire, the object can be identified as desirable and thus to be pursued or as undesirable and thus to be avoided. What Aristotle does make explicit and,

indeed, quite emphatic is that after desire targets some object as desirable, practical *nous* initiates motion (ἡ διάνοια κινεῖ) (III 10.433a19). For the starting point (ἀρχὴ) of practical *nous* is the object of desire (τὸ ὀρεκτόν) (III 10.433a19). Further, whenever *phantasia* initiates motion, it does not do so without desire (οὐ κινεῖ ἄνευ ὀρέξεως) (III 10.433a20-21). It's clear that Aristotle is ascribing primacy to the faculty of desire. Desire isn't just a necessary condition for voluntary self-locomotion. Rather, it's the central motive factor. But it's also clear that Aristotle would see it as obviously confused to hold that desire functioning on its own is the cause or explanation of self-motion. It's not just the case that other necessary conditions must be satisfied such as the absence of barriers around the animal in question, and the presence of more basic faculties of the soul such as the nutritive and sensitive faculties. Instead, desire, practical *nous*, and *phantasia* work together. This is a far cry from a view that posits that faculties or parts of the soul function in a mutually exclusive way. It's not clear that Aristotle would even see it as at all coherent to posit the faculty of desire functioning in a vacuum, as it were, causing self-motion without the aid of any of the functions of any other soul-faculties.

But the preceding claims should be treated with some caution. For Aristotle takes it for granted that none of the above undermines the view that if there is and must be in an important sense *just one thing* initiating motion (ἕν δή τι τὸ κινοῦν), it is the faculty of desire (τὸ ὀρεκτικόν) (III 10.433a21).[64] Aristotle says that if there were two movers, cognition –

[64] Some manuscripts have τὸ ὀρεκτόν ('the object of desire') rather than τὸ ὀρεκτικόν ('the faculty of desire') here at 433a21. We find τὸ ὀρεκτικόν in Manuscript C, Par. Coisl. 386, saec. xi (Forster); and in Manuscript U, Vat. 260, saec. xiv (Bekker). On the other hand, we find τὸ ὀρεκτόν in Manuscript E, Par. 1853, saec. x (Bekker). And if R.D. Hicks is correct in claiming that 'the text of the *De Anima* rests mainly on the authority of a single good manuscript, Cod. Parisiensis 1853, better known by the symbol E, given it by Bekker' then perhaps we should use τὸ ὀρεκτόν rather than τὸ ὀρεκτικόν here. Shields (2016: 68) uses τὸ ὀρεκτικόν. Polansky (2007: 516) uses τὸ ὀρεκτόν. Ross (1961) uses τὸ ὀρεκτικόν. One might think that a good deal hangs on whether ὀρεκτόν or ὀρεκτικόν is selected. For there is surely a big difference between (a) Aristotle's saying that the faculty of desire is the single, primary mover in the souls of self-movers, and (b) Aristotle's saying that

construed as practical nous and *phantasia* – and desire, they would move according to some common form (κατὰ κοινὸν ἄν τι ἐκίνουν εἶδος) (III 10.433a22-23). Whereas reason seems to never initiate movement without desire (since wish is desire, and whenever something is moved in accordance with calculation, it is also moved in accordance with wish), desire sometimes initiates motion opposed to calculation (παρὰ τὸν λογισμόν). For appetite (ἐπιθυμία) is a kind of desire (ὄρεξίς) (III 10.433a23-25). Aristotle reiterates that it is 'evident [φανερόν]' that 'what is called desire [ἡ καλουμένη ὄρεξις] is the sort of capacity [δύναμις] in the soul which initiates motion [κινεῖ]' (III 10.433a31-b1). So for Aristotle the following claims come apart in a vital way, and the first is false whereas the second is true:

Multiple movers: Desire and reason/*nous* (construed as *phantasia* and practical *nous*) are both the movers (τὰ κινοῦντα) in the soul that explain why most human and non-human animals are capable of voluntary self-locomotion.

One mover requiring other faculties: Desire is the principal mover in the soul that explains why most human and non-human animals are capable of voluntary self-locomotion. But when desire functions as this principal mover, it does so in ways deeply connected to and reliant on the functions of forms of cognition including *phantasia* and practical reason.

Aristotle evidently thinks that *One mover requiring other faculties* does not entail or, for that matter, provide much support for *Multiple movers*. That seems reasonable: I might reasonably hold that (a) the driver of the bus in which I'm seated moves me, while also holding that (b) the bus's moving me is deeply connected to and reliant on the function of the traction of the road, my not defenestrating myself, and, say, the proper functioning of the bus's engine and tires, and also that (c) nothing in (b) is, strictly speaking, a mover.

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the object of desire is the single, primary mover in the souls of self-movers. Superficially, (b) might seem more appealing, since (a) might seem to commit Aristotle to beginning III 10 by arguing that both the faculty of desire and the faculty of *nous* (the latter construed as *phantasia* and practical *nous*) are the movers and proceeding to contradict himself by saying that only the faculty of desire is the mover. But it seems to me that this line of reasoning conflates what I call on the next page 'Multiple movers' and 'One mover requiring other faculties'. Aristotle isn't contradicting himself, on my reading. Rather, he's giving primacy to the faculty of desire while also arguing that practical *nous* and *phantasia* have crucial roles to play in causing voluntary self-locomotion. It seems to me that τὸ ὀρεκτόν ('the object of desire') rather than τὸ ὀρεκτικόν ('the faculty of desire') come to the same thing in this context: both indicate that desire is the primary motive factor when it comes to self-motion. Desire doesn't work without some object taken as desirable.

Aristotle provides more argumentation in support of *One mover requiring other faculties* and against *Multiple movers*. But first he emphasizes that the object taken to be desirable (τὸ ὀρεκτόν) by the faculty of desire is always (ἀεὶ) what initiates motion (κινεῖ) (III 10.433a26-27). Practical *nous* and desire are always aimed at some goal or end, and practical *nous* and desire explain self-motion. So self-motion is always directed at some goal or end, some object of desire. Self-motion begins with that object taken to be desirable. There is no point to self-motion without that object. The object of desire must be within the sphere of what can be done or the practical good (τὸ πρακτὸν ἀγαθόν), that is, what is contingent and can be otherwise (τὸ ἐνδεχόμενον καὶ ἄλλως ἔχειν), as opposed to good but necessary things such as the eternity of the world, that 2 + 2 = 4 or that the species of man has eyesight. The object must be taken to be attainable by the animal in question.[65] Further, the object that starts self-motion by being taken to be desirable might be the good (τὸ ἀγαθὸν) or merely the apparent good (τὸ φαινόμενον ἀγαθόν) (III 10.433a27-30).[66] For desire and *phantasia* are sometimes correct but at other times not correct, whereas reason is in every instance correct (III 10.433a26). So the object taken to be desirable might not be what is genuinely good. Self-motion might be directed toward what merely appears to be good.

Aristotle takes his discussion to have shown that (φανερόν ὅτι μὲν οὖν = 'it is therefore evident that') what is called desire (ἡ καλουμένη ὄρεξις) is the sort of capacity (ἡ τοιαύτη δύναμις) in the soul which initiates motion (κινεῖ τῆς ψυχῆς) (III 10.433a31-b1). He then comments on those who distinguish parts of the soul (διαιροῦσι τὰ μέρη τῆς

[65] We find in Plato's *Symposium* 200a-e an emphasis on the point that desire cannot be for what is currently possessed. I'm not sure that Aristotle would agree. For on Aristotle's account, a fully virtuous person both possesses virtue and desires virtue; she enjoys doing things in accordance with her virtue, thus enhancing her virtue. Moss (2012) gives a nice description and analysis of Aristotle's distinction between the good and the apparent good.

[66] Aristotle argues in the *Nicomachean Ethics* III 4 that good people desire the good whereas less good (and simply bad) people often desire for the merely apparent good, preferring pleasure over the good (1113a25-b2, 1114a31-b25; cf. *Metaphysics* XII 7.1072a26-28).

ψυχῆς): 'if they distinguish and separate the parts in accordance with their potentialities [ἐὰν κατὰ τὰς δυνάμεις διαιρῶσι καὶ χωρίζωσι], there will turn out to be a great many parts of the soul [πάμπολλα γίνεται]' (III 10.433b1-2). It is not at all clear whether Aristotle means that would be generated an unmanageably large number of parts of the soul, thus causing trouble for the desideratum of *Number*. He doesn't say or appear to suggest that. He merely says that as a consequence there'll be the parts he's already discussed at length in *De Anima* including III 9, namely, parts and faculties including the nutritive (θρεπτικόν), sensitive (αἰσθητικόν), thinking (νοητικόν), deliberating (βουλευτικόν), and desiring (ὀρεκτικόν) (III 10.433b2-4).[67] Still, it's not clear that this list is meant to be exhaustive. In fact, it seems intimated in the text that the list provided isn't exhaustive. For Aristotle seems to be taking a jab at Plato: 'these [faculties mentioned above, the nutritive, sensitive, thinking, deliberating, and desiring] differ from one another to a greater extent than do the faculties of appetite [ἐπιθυμητικὸν] and spirit [θυμικόν]' (III 10.433b4-5). There can be no doubt that the faculties of appetite (ἐπιθυμητικὸν) and spirit (θυμικόν) refer to Plato's divison of the soul. Plato distinguishes the appetitive, spirited, and rational parts of the soul based on different functions made clear by their opposition to one another (*Republic* 353d, 436a-c). So, Aristotle seems to be arguing that if Plato's parts of the soul ought to be posited then, on the assumption that *Joint exhaustiveness* must be satisfied, so should many other parts and perhaps an unmanageable number of them (thus making trouble for *Number*). In any case, Aristotle does seem to express a good deal of uneasiness here about distinguishing and separating the parts of the soul according to the potential functions or capacities of the soul. This suggests

[67] Here Aristotle includes a deliberative faculty whereas earlier on he mentioned, instead, a faculty of locomotion (414a32). The latter is not included in III 10. Presumably this is because Aristotle wants to push back against the view that for each capacity or potentiality of the soul, there must be a distinct, corresponding faculty or part of the soul.

that he does not think that the correct method of satisfying *Joint exhaustiveness* is to simply assign a separate part of the soul for every capacity that the soul manifests. Thus Aristotle seems to think that there is an important distinction between, on the one hand, capacities or potentialities of the soul and, on the other, parts of the soul.[68] So, for Aristotle, *Mutual exclusivity* ought not to be so strong as to entail that each capacity or potentiality marks a different part of the soul.

Aristotle then gives an interesting series of arguments against the claim that there are multiple movers in the soul when it comes to voluntary self-locomotion, that is, against *Multiple movers*, and in support of *One mover requiring other faculties*. He begins by noting that desires (ὀρέξεις) arise opposite to one another (γίνονται ἐναντίαι ἀλλήλαις) whenever rationality (ὁ λόγος) and the appetites (αἱ ἐπιθυμίαι) are opposed (III 10.433b5-6). This comes about in those (ἐν τοῖς) with a perception of time (χρόνου αἴσθησιν ἔχουσιν) (III 10.433b7). For in such cases, 'reason encourages (κελεύει) a pulling back (ἀνθέλκειν) because of (διὰ) what is going to happen (τὸ μέλλον), whereas appetite operates because of what is already present (τὸ ἤδη)' (III 10.433b7-8). If, for example, I desire to leave my computer and my work and go read some Tolkein in the other room, my reason might encourage me to pull back from satisfying that desire because *nous* helps me to expect a failure to complete my work if I were to satisfy that desire. Aristotle explains, 'a present pleasure (τὸ ἤδη ἡδὺ) appears to be an unqualified pleasure (ἁπλῶς ἡδὺ), and an unqualified good (ἀγαθὸν ἁπλῶς), because of its not seeing (μὴ ὁρᾶν) what is going to happen (τὸ μέλλον)' (III 10.433b7-10). Reading enthralling fiction is a pleasure that might appear to be an unqualified pleasure and an unqualified good when only appetite or desire is in action. Desire doesn't consider or, as Aristotle more strongly suggests, even see what might well

[68] This is the interpretation of this passage taken in Corcilius and Gregoric (2010: 84).

happen as a result of my satisfying my desire. But once reason comes into play, I see and presumably take into serious consideration the likely, future consequences of my satisfying my desire. With the role of reason, the desired course of action fades from appearing to be unqualifiedly pleasurable and good to a qualified and rather costly pleasure, merely an apparent good.

Aristotle concludes, 'what initiates motion (τὸ κινοῦν) is one in kind (εἴδει): the faculty of desire insofar as it is a faculty of desire (τὸ ὀρεκτικόν, ᾗ ὀρεκτικόν)' (433b10-11). Aristotle's reasons for this inference are initially a little opaque. But he seems to mean that even if different objects (reading fiction, working at my computer, etc.) produce conflicting desires, it's still the case that the faculty of desire desires those objects. Each desire comes from the faculty of desire. It would be superfluous to posit further faculties or parts of the soul to explain what can be perfectly well explained by the faculty of desire. Aristotle seems to be emphasizing and perhaps slightly strengthening *Number* here. He's not merely presupposing that the number of parts of the soul ought to be manageable; in addition, he seems to be presupposing that we shouldn't posit any parts of the soul that are not strictly necessary to satisfy *Joint exhaustiveness*, to explain what needs to be explained. Also, Aristotle seems to be firmly defending *One mover requiring other faculties* and, in particular, attacking *Multiple movers*. The conclusion of this argument could hardly be more emphatic in that respect: the mover is one in kind, namely, the faculty of desire insofar as it is a faculty of desire. Note that the qualification 'in kind' (εἴδει) leaves room for there being more than one mover in a different, less fundamental sense. It leaves room for the vital role of forms of cognition such as *phantasia* in the explanation for voluntary self-locomotion. Thus Aristotle qualifies his conclusion of this argument: 'First of all is the object of desire, since this initiates motion without being moved, by being thought of or imagined [τῷ νοηθῆναι ἢ

φαντασθῆναι]' (III 10.433b11-12). As we'll see, through to the end of III 10 Aristotle holds onto the claim that desire never functions without *phantasia*.

There is a further sense, though, in which Aristotle argues that there are multiple things initiating and explaining self-motion. There is, first, what initiates motion (τὸ κινοῦν) without being moved. This is the practical good (τὸ πρακτὸν ἀγαθόν), taken to be within the (human or non-human) animal's power. Second, there is the thing by which motion is initiated (ᾧ κινεῖ). This is the faculty of desire. It both causes motion and is itself moved. Then, finally, there is the thing that is moved (τὸ κινούμενον). This is the animal (τὸ ζῷον) as a whole (III 10.433b13-15).[69] So, in this sense, there are two things initiating and explaining self-motion: the practical good to be accomplished and the faculty of desire. The object taken to be desirable and the faculty of desire always work together as the cause of voluntary self-locomotion. Neither functions without the other. They function together like the concave and the convex parts in the joint of a hinge (γιγγλυμός) (III 10.433b20-23). Though they differ in account, they are inseparable in magnitude (III 10.433b24-25).

Aristotle sums up his conclusions in III 10 by stating, 'insofar as an animal is capable of desire [ᾗ ὀρεκτικὸν] it is, in virtue of this, capable of moving itself [ταύτῃ αὑτοῦ κινητικόν]; but it is not capable of desire without *phantasia* [οὐκ ἄνευ φαντασίας]' (433b27-28). He sees his arguments as having rejected both of the following options: (1) desire alone is the source in the soul of voluntary self-locomotion, operating without any aid; and (2) there are multiple parts and faculties in the soul each of which is a distinct mover with respect to voluntary self-locomotion. Instead, Aristotle has argued that (3) animals are capable of voluntary self-locomotion just insofar as they are capable of desire and possess

[69] This account is consistent with the account found in sections of *De Motu Animalium* such as *De Motu* 6-8, as well as Aristotle's account of motion in the *Physics* 256b14-24 (cf. *Metaphysics* 1072a24-30).

the faculty of desire, so that desire is the mover in the soul of self-movers; but just as the faculty of desire requires an unmoved mover, namely, the practical good, so desire in order to cause self-motion never operates without forms of cognition such as *phantasia*. To a large extent, Aristotle argues against (1) in III 9. There he also argues, as was explained in the previous section, against the claim that any of the obvious candidates can be the part of the soul which, functioning entirely on its own, causes voluntary self-locomotion. Aristotle buttresses his rejection of (1) in III 10. So, III 10 is not in tension with III 9. Rather, III 10's arguments compliment III 9's: III 9 argues that if the desiderata of *Joint exhaustiveness* and *Number* are to be satisfied, then *Mutual exclusivity* must be realistically softened. In III 10 Aristotle argues carefully against (2), the position I referred to earlier and then consistently throughout this section as *Multiple movers*. Though *Mutual exclusivity* must be softened, desire still has authority and primacy in the capacity for self-motion.[70]

IV. CONCLUSION

[70] My view is a more moderate – and, I think, a little more exegetically plausible – than the view argued for in Whiting (2002). Whiting reads Aristotle as positing a locomotive part of the soul that comprises τὸ αἰσθητικόν ('the faculty of desire'), τὸ φανταστικόν (what I've been calling *phantasia*, and which can be semi-accurately translated 'the faculty of imagination'), and τὸ ὀρεκτικόν ('the faculty of desire'). This reading has some merits. It becomes rather easy to explain why in *De Anima* III 9 Aristotle rejects each of the reasonable candidates for the soul's source of voluntary self-locomotion: Aristotle is showing in III 9 that in order to account for this capacity it must be conceded that what might in other respects or by other appearances be distinct parts of the soul in fact comprise a single, locomotive part of the soul. The way I have cast Aristotle's discussion, Whiting's view commits Aristotle to a remarkably strong concession when it comes to *Mutual exclusivity*. As Whiting concedes, there is of course a sense in which the sensitive faculty of the soul is functionally distinct from the desiring faculty; I can, for instance, perceive something as good without desiring to do it, and I can perceive something as bad without desiring not to do it. I can perceive exercise as good without desiring to exercise, and I can perceive chips as bad without desiring to stop eating chips. Still, this concession might not be fatal or even problematic for Whiting's view is Aristotle himself conceded this separation while also consistently speaking of a locomotive part of the soul, or at least making it clear that he has such a part in mind. The trouble is that in the texts as they've come down to us, Aristotle simply doesn't do that. Throughout *De Anima* III 9-10, as I explained when I took the reader through the text earlier in this paper, we find Aristotle speaking of the search for mover (τὸ κινοῦν) in the souls of animals as the source of voluntary self-locomotion. We find him speaking of the functions of the nutritive faculty, the faculty of desire, *phantasia*, sensation, and *nous,* that is, ἡ θρεπτικὴ δύναμις, τὸ ὀρεκτικόν, τὸ φανταστικόν, τὸ αἰσθητικόν, and τὸ λογιστικὸν (νοῦς). But Aristotle – here and elsewhere – does not tend to speak of any locomotive faculty or part of the soul, that is, τὸ κινητικόν. It sseems faithful to the texts to say that Aristotle posits a locomotive capacity of the soul. But that does not entail that Aristotle takes there to be a locomotive faculty of part of the soul that comprises otherwise distinct parts or faculties.

I've offered a new reading of Aristotle's *De Anima* III 9-10 on which he argues that unlike most other significant capacities, self-motion seems to require the use of more than one part of the soul. In order to satisfy the desiderata of (1) *joint exhaustiveness* (the parts explain all the capacities of living things, that is, what plants and animals can do) and (2) *number* (there has to be a manageable number of parts), the desideratum of (3) *mutual exclusivity* (each capacity of living things is controlled by only one part of the soul) must in an important sense be softened when it comes to voluntary self-locomotion. Whereas, for example, (a) the nutritive faculty alone is responsible for growing, (b) *phantasia* alone is responsible for dreaming, and (c) intellective *nous* alone is responsible for abstract thought, (d) voluntary self-locomotion requires that practical *nous* and *phantasi*a function together with the faculty of desire, even if desire is still the primary factor. This reading eases the tension between III 9's arguing that neither *nous* nor desire is the source of voluntary self-locomotion and III 10's arguing that desire and *nous* are both the source. It also helps to explain why Aristotle sometimes expresses uneasiness about positing distinct parts of the soul, while nonetheless positing distinct parts of the soul, without any apparent sights set on a *reductio ad absurdum* proof or anything to that effect.

Aristotle sees the need to show that the parts of the soul adequately explain not just capacities such as reasoning, desiring, and self-control but in addition capacities such as growth, reproduction, seeing, hearing, smelling, touching, tasting, the receiving and processing of images, deliberating, and self-motion. He sees the accounts of the soul given by his predecessors (including Plato) as inadequate in that respect: their accounts didn't satisfy *Joint exhaustiveness*. They didn't posit enough parts. But Aristotle also seems to be aware of the danger of positing a distinct part of the soul for each and every capacity, from thumb twiddling to chin stroking. He aims for an ideally parsimonious theory. A theory with

too many parts wouldn't satisfy *Number*. Satisfying both desiderata – *Number* and *Joint exhaustiveness* – requires softening but not falsifying *Mutual Exclusivity* when it comes to capacities such as self-motion.

CHAPTER 6

ARISTOTLE ON MOTION IN INCOMPLETE ANIMALS

Abstract: I explain what Aristotle means when, after puzzling about the matter of motion in incomplete animals (those without sight, smell, hearing), he suggests in *De Anima* iii 11.433b31-434a5 that just as incomplete animals are moved indeterminately, desire and *phantasia* are present in those animals, but present indeterminately. I argue that self-motion and its directing faculties in incomplete animals differ in degree but not in kind from those of complete animals. I examine how an object of desire differs for an incomplete animal. Finally, using a comparison with Aristotle's account of recollection, especially in unfavorable circumstances, I describe indeterminate self-motion.

I. INTRODUCTION

We've seen how Aristotle distinguishes his notion of self-motion from the Platonic, unqualified notion of self-motion by arguing for at least one basic qualification on any instance of self-motion (and, indeed, any instance of motion and change). We've seen how Aristotle is careful to restrict this notion of self-motion, that is, why he thinks that natural elemental motion can't count as self-motion and why growth, metabolism, and reproduction in plants can't count as self-change. In emphasizing ways in which animal locomotion is self-directed, autonomous, and independent whereas other kinds of natural changes are other-directed and dependent, we've also seen that in some cases the matter is not nearly as simple as we might assume. We've seen how deeply reliant self-moving animals are on many internal and external factors largely outside their control, much as they are outside the control of plants, in order to sustain themselves and satisfy the various necessary conditions for living and moving. Most recently, we've seen that the proper functioning of faculties in an animal's soul is absolutely crucial for, and directive of, whether an animal moves itself and

in what way (which direction, toward which object) it moves itself. Desire must function as the primary mover, but always together with *phantasia* and practical nous. Here I wish to bring out the reliance and dependence of those self-motion-driving faculties on the presence and proper functioning of specific sensory capacities, namely, the distance senses: sight, smell, and hearing. If an animal can touch and taste but cannot hear, see, or smell, can it still move itself? This question is, as we'll see, not merely hypothetical, for us or for Aristotle.

Aristotle's remarks on animal self-motion are almost exclusively focused on animals possessing hearing, sight, smell, touch, and taste.[71] That includes most animals. But we might well wonder what Aristotle would say about those animals which have only the basic senses, touch and taste – Aristotle argues that taste is also a kind of touch (see, for example, *DA* III 12.434b18). These include sea sponges, sea anemone, mussels, clams, scallops, starfish, solens (razor shells), holothurians, sea lungs, ascidians, sea urchins, and oysters. Incomplete animals are described throughout the biological works. In some cases they're described as moving from one place to another not because they are pushed or pulled but seemingly by their own impetus:

Another species of the sea anemone roams freely abroad. The sea anemone appears to be devoid altogether of excretion, and in this respect it resembles a plant. …Of the sea-anemone there are two species; and of these one species lives in hollows and never loosens its hold upon the rocks, and the other lives on smooth flat reefs, free and detached, and shifts its position from time to time. Limpets also detach themselves, and shift from place to place (*HA* 531b7-b9, 548a24-27).

[71] Understandably, that is also the focus of the literature on Aristotle's account of self-motion: see Berryman (2002), Broadie (1982: 204-261), Corcilius and Gregoric (2013), Freeland (1994), Furley (1978), Gill (1991), Meyer (1994), Morison (2004), Wardy (1990: 93-99, 112-119), and Waterlow (1982). There is as yet no literature devoted to the question I address here, namely, Aristotle's account of self-motion and its directing faculties in animals with only touch and taste. Guremen (2015) interprets Aristotle's view of the status of some of these animals. Guremen takes as his central focus *Parts of Animals* II 10.655b37-656a8, where Aristotle seems to identify a group of animals that are "merely living" or "living only", that is, animals that have only touch and taste, lacking all other sensory capacities. Guremen argues that the loose-textured sea sponge and the fixed (immobile) and hard kind of sea anemone are the animals Aristotle means by "merely living". Though we are both interested in incomplete animals, my focus is very different.

Aristotle doesn't ascribe any sense of sight, hearing or smell to the sea anemone. But he reports that the sea anemone has sensation. When touched by a human hand, the creature seizes and clings onto that hand. In addition, it has a mouth by which it feeds. Without the ability to feel pleasure and pain, and without the ability to sense by touch and taste, the sea anemone would be unable to discriminate between food (such as scallops) and non-food such as jagged rocks. So these creatures "appear [φαίνεται] to have [ἐνοῦσα] pain [λύπη] and pleasure [καὶ ἡδονὴ] in them" (*DA* III 11.434a2). One species of sea anemone "roams freely abroad" (531b8). How does it do so, seemingly in search of food? After all, Aristotle says that this creature resembles a plant. Other examples include scallops, limpets, sea urchins, and molluscs.[72] All of these creatures seem to be incapable of hearing, seeing, and smelling. Like all animals, they have at least some capacity for sensation, e.g., "The sponge actually appears to be endowed with a certain sensibility: as a sign of which it is alleged that the difficulty in detaching it is increased if the movement is not covertly applied" (*HA* 487b9-11, cf. *HA* 548b10-12).

Why do sea anemone, sea urchins, limpets, molluscs, and other incomplete creatures move themselves from one place to another? True, sea urchins use their spines as feet when they move themselves. But that's just the material explanation. Why, in the first place, does a sea urchin bother to move *without* hearing or seeing or smelling an object of pleasure or pain? There is only one passage in which Aristotle explicitly addresses these questions, and this will be the central passage of interest in this paper:

[1] It is also necessary to consider what initiates motion [τὸ κινοῦν] in imperfectly developed animals [τῶν ἀτελῶν], those whose sensation is limited to touch and taste [ἁφῇ]; whether or not it is possible for them to have *phantasia* and appetite [ἐπιθυμίαν]. [2] For they appear to

[72] Animals that remain stationary their whole lives and, in most cases, lack the distances senses are described in Aristotle's biological works; see, for example, *DA* II 2.413b2-4, III 9.432b19-21, *HA* I 1.487b6-7, 14-15, *PA* IV 7.683b5-10. He's interested in mobile incomplete animals in our target passage here, though, rather than stationary incomplete animals.

have pleasure and pain in them; but if they have these, then it is necessary that they have appetite as well. But how could they have *phantasia* in them? [3] Or rather, just as they are moved indeterminately [κινεῖται ἀορίστως], these things are present in them, but present indeterminately [ἀορίστως δ' ἔνεστιν] (*DA* III 11.433b31-434a5).[73]

In [1], Aristotle seems to be posing the following puzzle: (a) there are some animals which lack hearing, sight, and smell, possessing only touch and taste (creatures including the mobile sea anemone described in his biological works); (b) some of the animals in (a) move themselves rather than exclusively being moved by something else; (c) it's been established (just prior to this passage, in *DA* III 9-10) that the directing faculties in the soul with regard to self-motion in complete animals are desire and *phantasia* (the latter is an internal image-forming capacity, often translated "imagination" but also sometimes just transliterated due to difficulties in finding an appropriate English fit[74]); so, implicitly, (d) the motion of incomplete animals is also directed by *phantasia* and desire; therefore (e) we should determine whether or not incomplete animals possess *phantasia* and desire or, whether, given the comparative simplicity of such creatures, the initiation of motion in them is directed by some other more basic faculties or means.

In [2], "For they appear to have pleasure and pain in them; but if they have these, then it is necessary that they have appetite as well. But how could they have *phantasia* in

[73] All Greek text is taken from the OCT, Ross (1956). English translations are generally taken from Shields (2016), with some of my own minor modifications.

[74] Everyone knows that 'imagination' is the conventional English translation of Aristotle's Greek, φαντασία, and everyone knows that this is not an ideally accurate translation. But no one seems to know how to translate *phantasia* more accurately in English. Aristotle tells us in the *Rhetoric* that *phantasia* is "a weak sort of perception" (I 11.1370a28-29), and in his extant work on dreams he says that *phantasia* is the same thing as perception, though they differ in their being (*De insomniis* 459a16-21). In *De Anima* III 3.3, a notoriously difficult text, Aristotle argues that *phantasia* is the capacity responsible for producing images, but he also argues that *phantasia* explains appearances. The ordinary sense of "imagination" is something like the faculty of forming new ideas, images, or concepts of things not present to the senses; or, more generally, the ability of the mind to be creative or resourceful. That does not sound like what Aristotle has in mind for the functions of *phantasia*. Now, one might argue: Neither φαντασία nor its transliteration is an English word. 'Imagination' might not be ideally accurate, but I do not see how it is at all illuminating to use φαντασία or *phantasia* without any translation. A semi-accurate translation is better than no translation at all. But one might also argue: a transliteration without any English translation at all is less misleading than a semi-accurate English translation that misleads readers quite a bit. I'll leave φαντασία transliterated but untranslated, as is done, for example, in Caston (1996), Moss (2012) and Scheiter (2012).

them", Aristotle gives an importantly distinct reason for thinking that desire and *phantasia* are present in incomplete animals (thus lending further support to (d)): sea urchins, scallops, limpets, sea anemone, and other incomplete creatures clearly feel some kind of pain and pleasure, and if they have pain and pleasure in them then they ought to have *phantasia* and appetite (and thus desire). This argument is deeply rooted in the account of the soul Aristotle has been developing. Earlier on in his discussion of the soul's capacities, Aristotle argues that if there is the sensitive faculty in a living creature then there must also be the faculty of desire present in that creature (εἰ δὲ τὸ αἰσθητικόν, καὶ τὸ ὀρεκτικόν) (*DA* II 3.414a31). Appetite (ἐπιθυμία) is one of the types of desire (ὄρεξις), along with anger (θυμὸς), and will (βούλησις).[75] All human and non-human animals (τὰ ζῷα) have the sense of touch (τὴν ἁφήν). All animals have some sense as to what is the pleasant (τὸ ἡδύ) as opposed to the painful (τὸ λυπηρόν). So all animals have desire and appetite for what is pleasant and aversion to what is painful or unpleasant (*DA* II 3.414a32-34).

Later on in *De Anima* (though still prior to his discussion of the soul-capacity responsible for most animals' ability to move themselves), Aristotle argues that whereas sensation is like (αἰσθάνεσθαι ὅμοιον) the mere (μόνον) act of saying something (φάνα) or understanding something (νοεῖν), whenever (ὅταν) the animal senses an object taken to be pleasant or painful, due to its soul the animal avoids (φεύγει) the painful object or pursues (διώκει) the pleasant object as a kind of affirmation or negation (οἷον καταφᾶσα ἢ ἀποφᾶσα) of the mere utterance provided by sensation (*DA* III 7.431a7-10). There is, then,

[75] In Aristotle, ἐπιθυμία is "usually translated 'appetite', but 'desire', 'bodily desire' and 'wanting' have also been used or suggested" (Pearson 2012: 5) – see 'desire' in Bostock (2000: 34), 'bodily desire' in Crisp (2000), and 'wanting' in Hamlyn (1993). ἐπιθυμία is one of the three main types of ὄρεξις (usually translated "desire"), along with θύμος ("spirit" or "anger" or "temper" or "impulses of temper" or "passion" or "emotion" or "retaliatory desire") and βούλησις ("wish" or "volition" or "rational wish" or "good-based desire"); see *DA* II 3.414b1-6, cf. II 2.413b21-24, III 9.432b3-7, III 10.433a25-26, *De motu* 6.700b22, *EE* 2.7.1223a26-27. It seems to me that Aristotle uses ἐπιθυμία in our target *DA* passage to emphasize that incomplete animals are capable of only the most basic kind of desire.

a tight connection between sensation and desire in an animal's soul; in a key sense, they are not distinct (οὐχ ἕτερον), just as in an important sense the desiring faculty is not distinct from the faculty of avoidance (τὸ φευκτικόν) – even though they differ with respect to their being or essence (ἀλλὰ τὸ εἶναι ἄλλο) (III 7.431a11-14).

There is also, for Aristotle, a tight connection between *phantasia* and desire. Aristotle immediately goes on to discuss the relation between the function of desire and the products of *phantasia*, namely, images or imaginative phantasms (τὰ φαντάσματα). He argues that the soul cannot understand anything without the use of images (*DA* III 7.431a16-17). This is because "the images [τὰ φαντάσματα] are sense-objects [οἷον αἰσθήματα ὑπάρχει] to the thinking soul [τῇ διανοητικῇ ψυχῇ]", and whenever (ὅταν) it affirms one of those sense-objects as good it pursues it; whenever it denies one (so it sees that sense-object as bad) it avoids it (*DA* III 7.431a15-17). Moreover, just before III 11's discussion, Aristotle argues that when it comes to the capacity for voluntary self-locomotion, the functioning of desire or appetite (ἐπιθυμία, ὀρεκτικὸν or ὄρεξις) and the functioning of basic forms of cognition including *phantasia* are entangled, such that a self-moving animal "is not capable of desire without *phantasia* [ὀρεκτικὸν δὲ οὐκ ἄνευ φαντασίας]" (*DA* III 10.433b27).

My aim in this paper is to explain what Aristotle means when he suggests in [3] that just as incomplete animals are moved indeterminately (κινεῖται ἀορίστως), desire and *phantasia* are present in them, but present indeterminately (ἀορίστως δ' ἔνεστιν). Commentators are unsure of how to understand Aristotle's suggestion, and there is as yet no focused, in-depth study of this specific problem.[76] I'll first explain that and why Aristotle is interested here in voluntary self-locomotion in animals rather than other kinds of changes

[76] See the brief but helpful (and, in some senses, conflicting) commentaries on this passage in Lorenz (2006: 125), Pearson (2012: 58-59), Polansy (2007: 528-529), Richardson (1995: 286n16), Scheiter (2012: 259), Shields (2016: 364-365), and Wedin (1988: 41).

(Section 2). I'll argue that Aristotle's specific view must fit under the following general description: self-motion and its directing faculties (desire and *phantasia*) in incomplete animals differ in degree but not in kind from those of complete animals (Section 3). I examine how, exactly, an object of desire differs for an animal without any memories or *phantasms* involving sight, smell, and hearing. Inspired by Peter Strawson's "purely auditory universe" (1964: 68), I use Aristotle's account of touch and taste to construct a purely tactile and gustatory world (Section 4). Finally, using my results from previous sections, together with a comparison with Aristotle's account in *De Memoria* of recollection under unfavorable circumstances, I'll describe indeterminate (ἀορίστως) self-motion (Section 5).

II. FOCUSED ON VOLUNTARY SELF-LOCOMOTION

Aristotle is in this context exclusively interested in a very specific kind of change: voluntary self-locomotion. Aristotle is not interested in the source of change by growth and decrease; change by coming to be or ceasing to be; or in change by gaining or losing a quality (alteration). For Aristotle specifies at the outset of *DA* III 9, when he begins his investigation into the source of the capacity for self-motion in animals, that he is interested in change 'κατὰ τόπον', that is, change in place: Aristotle's *DA* III 9 begins by recapitulating the thesis – already stated in *De Anima* III 3.427a17-20, partially established earlier on in *De Anima* especially in II 1 through 5, and apparently taken as a reasonable way in which others have proceeded – that 'the soul' (ἡ ψυχὴ), the thing that gives plants and animals their capacities, the thing that makes living things alive has been defined (ὥρισται) by two capacities (δυνάμεις): first, by the faculty of judgment (κριτικῷ), which is the work (ἔργον) of thought (διανοίας) and perception (αἰσθήσεως); and, second, the capacity to move from one place to another (κατὰ τόπον κίνησιν), that is, by its initiating locomotion voluntarily

(*De An*. III 9.432a15-17).[77] Aristotle says that the former has been examined already (throughout *DA* II 2-3 and III 3-8). In III 9-11, he turns his attention to the second capacity.

Nor is Aristotle interested in the changes that occur by inhaling and exhaling, or in those that occur by sleeping and waking – those are discussed in the *Parva Naturalia* (see, for example, on respiration, *De somno* 456a1-24, *De juv*. 5, *De resp*. 8). Again, those sorts of changes do not require that the animal as a whole move from one place to another. Rather, such changes merely require that a part of the animal move. Moreover, even if it might seem fairly obvious in this context, it should be made clear that Aristotle is not interested in cases in which an animal is moved by force against its volition. Nor is he interested in rectilinear motion, circular motion of revolution around a center, or any combination of such kinds of motions (on these, see for instance *Physics* 261b28-29 and *De Caelo* 268b17-24).

Also, Aristotle is not interested in locomotion that merely seems self-originated but is not in fact voluntary; that is, he's interested in the self-motion of which most animals are capable and which most animals do very often, as opposed to the natural upward motion of fire and air and the natural downward motion of earth and water. *Physics* VIII 4.254b12-256a3 contains perhaps the clearest distinction between (a) the natural motion of the elements or simple bodies and (b) genuine, voluntary self-locomotion. Aristotle argues that

[77] As Moss (2012: 3-4) notes, we can understand what Aristotle means by the discerning faculty (κριτικῷ) as cognition, including (1) imagination, (2) perception, and (3) intellect or thought. On Aristotle's account, only human and non-human animals have cognition, though non-human animals lack (3); plants have souls but plants do not have any of (1)-(3). Ross (1961: 284) points out that *De Anima*'s first statement of this thesis, in III 3.427a17-20, has an apodosis that groups together τὸ νοεῖν ('the thinking'), τὸ φρονεῖν ('the understanding' or 'the exercising of practical wisdom') and τὸ αἰσθάνεσθαι ('the perceiving' or 'the sensing') as forming one of the two things by which the soul is usually defined. Aristotle's *Nicomachean Ethics* VI 3-7 provide a more careful treatment of the different kinds of knowledge than anything found in *De Anima.* Plants don't have either capacity, neither discernment nor voluntary self-locomotion. But most animals have both capacities to at least some degree. So Aristotle has in mind here the souls of animals in particular, rather than also the souls of plants.

whereas, for example, animals are capable of stopping their self-motion, water cannot stop itself from moving continuously downwards unless impeded by some obstacle – ditto for fire and air moving upwards, and earth moving downwards.[78] I do not break with the standard reading in this respect, then: "Aristotle's topic in his discussions of animal motivation in *De Anima* III 9-11 and in the *De Motu Animalium* is… the production of animal locomotion" (Lorenz 2006: 128).

Finally, I should note that the characteristic Platonic and Aristotelian expressions for self-motion are absent from this passage. Plato and Aristotle express self-motion with either (a) an active verb with an object and a reflexive pronoun (i.e. "to move itself by itself") such as in Aristotle's saying at *Physics* VIII 4.255a10-13 that it is unreasonable to think that something self-moving would exhibit one motion only or that something continuous could move itself by itself (ἄλογον δὲ καὶ τὸ μίαν κίνησιν κινεῖσθαι μόνην ὑφ' αὑτῶν, εἴγε αὑτὰ ἑαυτὰ κινοῦσιν), or (b) a passive verb with an agent (i.e. "to be moved by itself") such as in Plato's *Phaedrus* 245c-246. But we can still understand self-motion to be implied by even a cursory examination of the context: Aristotle is continuing the discussion from *DA* III 9-10 of the soul-faculty responsible for voluntary self-locomotion in animals. The absence of these expressions is not surprising. We do not say, "That dog is self-moving away from its

[78] It is neither anachronistic nor anti-Aristotelian to use the term 'voluntary' in 'voluntary self-locomotion' to pick out what, precisely, Aristotle is interested in throughout *De Anima* III 9-10. For in Aristotle's account of the voluntary and involuntary in his *Nicomachean Ethics* III 1-5, the involuntary is what something does by force (βίᾳ) or through ignorance (δι ἄγνοιαν), as opposed to having the principle or source or origin (ἀρχή) of the action in the agent, whether that agent is a human or non-human animal (1109b35-1110a1). For much more comprehensive accounts of Aristotle's account of the voluntary, see McGinley (1980), Meyer (1993), Meyer (2006), Muller (2015), Nielsen (2007), and Sakezles (2007). Aristotle also distinguishes between the voluntary and the non-voluntary; this distinction is applied in a more pertinent context, in his work on the motion of animals: 'We have now explained how animals move with voluntary [ἑκουσίους] motions, and for what reasons. But they also display involuntary [ἀκουσίους] movements in some of their parts, and more often non-voluntary [οὐχ ἑκουσίους] movements. By involuntary I mean such movements as those of the heart and the penis; for often these are moved when something appears, but without the command of thought. By non-voluntary, movements such as sleep and waking and respiration, and all the others of this kind; for neither *phantasia* nor desire is, strictly speaking, in control of any of these' (*De Motu* 11 703b2-10, trans. Nussbaum 1978). Ackrill (1978) is helpful on the context and character of Aristotle's account of voluntary actions.

owner!" Rather, we say, "That dog is running away from its owner". But we mean that the dog is moving itself. When the characteristic Platonic or Aristotelian expressions for self-motion *are* used, we can of course assume that self-motion is intended. But often those expressions are absent from Aristotle's writings (here but also *much* more frequently in his biological works) when the context shows that self-motion is implied.

III. A DIFFERENCE IN DEGREE

As we've seen, Aristotle is rather vague and evasive on the subject of motion in incomplete animals, merely suggesting that, "rather, just as incomplete animals are moved indeterminately [κινεῖται ἀορίστως], desire and *phantasia* are present in them, but present indeterminately [ἀορίστως δ' ἔνεστιν]" (*DA* III 11.434a4-5). So are incomplete creatures capable of self-motion, or not, on Aristotle's account? And do such creatures possess *phantasia* and desire, or not?

I think that Aristotle would answer those questions (in his typically qualified fashion) as follows: (1) incomplete animals such as sea urchins, limpets, and sea anemone are capable of self-motion; (2) they do possess the faculties that direct self-motion, namely desire and *phantasia*; but (3) their self-motion is less autonomous than that of complete animals; and (4) the desire and *phantasia* they possess has been given by nature to fit their comparatively basic needs, and is much more basic than is the desire and *phantasia* possessed by complete animals. On the whole, then, incomplete animals are capable of self-motion that differs notably in degree but not in kind from the self-motion of which complete animals are capable. Here's why I think this would be Aristotle's answer. On the one hand, without the defensive capacities and/or camouflage afforded to stationary animals, without desire, without any inward-image-forming capacity, without any ability to move itself based on its desires, and having only touch and taste and the ability to feel pain and pleasure, an

incomplete animal (without adequate defenses or camouflage) would be unable to respond adequately to pain and pleasure stimuli. It would be unable to survive. The animal would feel pain, for example, but it would be unable to form an internal image (through *phantasia*) of what is causing its pain, and it would be unable to form a desire to move to a place where the pain will stop. Thus, given Aristotle's pronounced teleological commitments, if nature arranged matters such that animals lacking the distance senses but possessing touch, taste, and the ability to feel pain and pleasure were without desire or *phantasia* or self-motion, nature would not provide such animals with the means to survive, let alone the means to flourish. Nature would not arrange matters in such an obviously pointless way.[79]

On the other hand, if nature were to provide incomplete animals with desire, *phantasia*, and self-moving capacities as sophisticated as those possessed by complete animals, nature would do something in vain. For a mobile sea anemone does not need to form images that incorporate sense data gained from sounds, sights, and smells. All such an animal requires is the most basic desire and capacity to move itself in search of pleasure and

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[79] One might, however, point out that there is a puzzling passage in which Aristotle seems to say that some animals lack *phantasia*:

> Further, sensation is always present in animals, though *phantasia* is not always present [φαντασία δ' οὔ]. If sensation and *phantasia* were the same in actuality, it would be possible for *phantasia* to belong to all beasts; but this does not seem to be the case. For instance, it belongs to the ant or the bee, but not to the grub [δοκεῖ δ' οὔ, οἷον μύρμηκι ἢ μελίττῃ, σκώληκι δ' οὔ]" (*DA* III 3.428a8-12).

Doesn't this passage undermine the claim that on Aristotle's view, if an animal has sensation then it must also have *phantasia* (and desire)? Contra Freudenthal (1863: 8), I am skeptical of this reading. Instead, I concur with Caston (1996) in not taking this passage as a counterexample to Aristotle's holding that there is co-extension between the capacity of *phantasia* and the capacity of *sensation*. First, this exception-clause is within the scope of δοκεῖ, "this seems to be the case". So, Aristotle isn't stating what he necessarily takes to be the case. Rather, Aristotle is being quite tentative here (Caston 1996: 23). Second, this is the only passage in the entire corpus where Aristotle seems to suggest that animals might have sensation or perception without *phantasia* or representation, whereas there are many passages both in and outside *De Anima* where Aristotle claims that every creature that has sensation must also have *phantasia*. He writes, for example, that plants are the only mortal creatures that can exist without *phantasia* (*DA* II 3.415a8-11). Outside *De Anima*, he writes that in general what is capable of *phantasia* and of sensation are the same, even though these two abilities differ in essence (*De insomn*. 1.459a15-17).

the relief from pain. That pain might be hunger caused by inadequate nutrition where it currently exists in its current state. Or it might be a predator currently attacking it, or an environment that's become inhospitable due to some collection of naturally (or unnaturally) occurring events. Mobile incomplete animals need self-motion, *phantasia*, and desire. But they do not need those capacities and faculties to the same degree of sophistication as do animals possessing sight, hearing, and smell. Nature gives the more advanced versions of those capacities to animals which need to move more often and in much more diverse ways, and to those which need to respond to more complex stimuli.[80]

IV. OBJECTS OF DESIRE IN INCOMPLETE ANIMALS

The answer given in the previous section is, I think, true, but it is also general and abstract: mobile, incomplete animals such as sea urchins can self-move and possess self-motion's directing faculties, but to a lesser degree than in cases of complete animals. What exactly does this answer amount to? First of all, what does an object of desire look like in an animal without the ability to hear, smell, or see? A further distinction is in order here. There is (a) *to orekton*, the object of desire, which is the end or goal (*telos*) of the action, and there is (b) a spatially located physical body that is the spatial location towards which the motion is directed. When it comes to self-motion, Aristotle means (a), not (b). For Aristotle, the origin of self-motion in animals is "the object of pursuit or avoidance in the sphere of action" (*De motu* 8.701b32-33).[81] That object of desire taken as attainable by the animal is the first mover: "the first mover is the object of desire and also of thought; not, however, every object of

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[80] One might think that there is a more immediately apparent reason for Aristotle's hesitating to ascribe *phantasia* to incomplete animals: it's not obvious what extra function *phantasia* would add to an animal that lacks all the distance senses but already possesses basic perception. For, as Scheiter (2013) helpfully emphasizes, "the essential difference between perception and *phantasia* lies in their immediate cause" (260). That is, "*phantasia* does not require the immediate presence of the physical object, whereas perception always does" (260). In an animal such as a sea anemone or a limpet or a sea urchin, then, what does *phantasia* do that perception doesn't? But this question, posed rhetorically, seems to have a straightforward answer: on Scheiter's view, *phantasia* not only creates images but also allows a creature to call them forth. Perception doesn't do that.

[81] English translations of *De motu animalium* are taken from Nussbaum (1978).

thought, but the end in the sphere of things that can be done. So it is a good of this sort that imparts movement, not everything noble" (*De motu* 6.700b23-25). The object of desire is the limit of all self-movements: "For all animals both impart movement and are moved for the sake of something, so that this is the limit to all their movement: the thing for-the-sake-of-which" (*De motu* 6.700b14-16). This is the apparent good. The faculty of desire targets an object as one of pleasure or one of pain. Then it acts accordingly: it pursues the object if it's taken to be one of pleasure, and avoids the object if it's taken to be one of pain: "For the painful is avoided and the pleasant pursued" (*De motu* 8.701b35-36). Animals are impelled to move, then, by desire. And the object moves desire: "the proximate reason for movement is desire, and this comes to be either through sense-perception or through *phantasia* or thought" (*De motu* 7.701a35-37). The general account on which locomotion is caused by the object of desire that moves the desire does not require moving towards something (spatially directed activity) but simply goal-directed activity. Goal-directed activity need not be location-directed motion. A purpose need not be getting to a location. So, even without the distance senses and thus without the ability to sense anything from a distance, an incomplete animal can still move itself toward an object of desire.

Returning to our question, then: what is an object of desire in a sea urchin, sea anemone, or limpet? Such creatures have no internal images (*phantasms*, internal images courtesy of *phantasia*) or sensory information of any kind from sight, hearing, or smell. As such, we can borrow a technique from Peter Strawson (1964). Strawson constructs a "purely auditory universe" (68) so as to answer the question, "Could a being whose experience was purely auditory have a conceptual scheme which provided for objective particulars?" (66) Our question is rather different, namely, "For an animal whose experience was purely tactile (whatever is collected from the sense of touch) and gustatory (whatever is collected from the

sense of taste), what is an object of desire, or, what is the goal of their seemingly self-directed motion?" But I suggest that a useful way of answering our question is to do something analogous to what Strawson does: construct a purely gustatory and tactile world.

We will fill this purely gustatory and tactile world, first of all, with Aristotle's account of what can be gleaned from touch and taste, respectively. Aristotle says that with taste a creature can have experiences of "the sweet and the bitter, the succulent and the saline, between these come the pungent, the harsh, the astringent and the acid; these pretty well exhaust the varieties of flavor" (*DA* II 10.422b11-13).[82] Having touch, a creature can also have experiences of "hot, cold, dry, moist, hard, soft, and so on" (*DA* II 11.422b25-26). Aristotle argues that all and only animals have sensation. All animals must at the very least possess touch and taste. For "it is by touch and taste that one distinguishes in food the pleasant from the unpleasant, so as to flee from the latter and pursue the former" (*Sense and Sensibilia* 1.436b15-16). More specifically, Aristotle argues, "heat or cold is the direct cause of growth or decay" and "all organisms are nourished by the sweet, either by itself or in combination with other savors" (*S&S* 4.441b30, 442a1-2). Magnitude and figure, roughness and smoothness, sharpness and bluntness found in solid bodies are percepts common to all

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[82] Aristotle sees taste as a kind of touch, and sees both touch and taste as (1) the senses without which no animal can exist, (2) the senses with which a creature must be an animal, and (3) the senses that are required for hearing, smell, and sight, but which can exist without hearing, sense, and sight (*DA* III 12. 434b16-17, 23-24, and *DA* III 13.435a13-15, 4-6; see also (*DA* 413b3-5, 414b3, 434b24, 435b5-7; *De Sensu* 436b13; and *Historia Animaium* 478a17). Aristotle connects touch with sleeping, aging, dying, disease, and health (*Somn. Vig.* 455a12-b2, *DA* 435b4-5, *DA* 435b4-5, and *PA* 648b2-10). There are some puzzles concerning Aristotle's account of touch, some of which Aristotle discusses (e.g. in *DA* II 11). Two that have received some helpful discussion in the literature include what Matthews (2011) calls (1) the "Counting Perplexity", that is, we speak of a single sense of touch, and it seems that this ought to be the case, yet unlike sounds, colors, tastes, and smells, objects of touch do not fall into a "natural named group" (as Freeland (1992: 228) nicely describes), and (2) the "Organ Perplexity", that is, whether flesh or what is analogous to flesh the organ of touch, since in the case of the other senses the matters seems much more straightforward – for smelling it's clear that the nose is the main organ, for seeing the eyes, for hearing the ears, and for taste the tongue. Other helpful discussions are found in Barker (1981), Bynum (1987), Johansen (1998), Modrak (1987), Polansky (2007), Ross (1956), Slakey (1961), and Sorabji (1971). For a rather different kind of treatment of Aristotle's account of touch, one that aims at tying together the whole of *De Anima*, see Golluber (2001).

the senses, or at least to touch (*S&S* 4.442b5-6).[83] Common sensibles also include unity, number, movement, and rest (*DA* III.1.425a16). Taste is, for Aristotle, the sense which "best perceives the common sensibles generally; and showed, the most perfect power of discerning figures in general" (*S&S* 4.442b16-17). Intermediate savors come from contraries such as the sweet and the bitter. Savors are infinite in number (*S&S* 4.442b22).

Using Aristotle's account, then, we have filled our purely gustatory and tactile world with sensibles including unity, number, movement, rest, magnitude, figure, roughness and smoothness, sharpness and bluntness, hot and cold, dry and moist, hard and soft, the pungent and the harsh, the astringent and the acid, the succulent and the saline, and the sweet and the bitter. In addition, of course, Aristotle notes that such creatures can feel pleasure and pain. We must now introduce a further modification to Strawson's strategy: we add to this world sea urchins, anemone, limpets, and other incomplete and mobile animals that generate Aristotle's puzzle in our central passage of interest (*DA* III 11.433b31-434a5). Like all non-human animals, such creatures are distinguished from animals such as human beings (according to Aristotle) by, for one thing, lacking reason (*nous*) proper. But this does not entail that there is no way to form a coherent object of desire in a sea urchin's world. Aristotle's suggestion, on my reading, is that such animals possess *phantasia* and desire more basic than those capacities possessed by complete animals. With *phantasia,* such creatures can not only sense the hot and cold, sweet and bitter, dry and moist, and so on, at one discrete moment followed by another discrete moment; rather, with *phantasia*, they can connect those sensations to form an internal image. And they can identify that internal image as an object of pleasure; with desire, they can have the impulse to move toward or consume something conforming to that internal image representing an object of pleasure, that object of desire

[83] Aristotle argues in *Sense and Sensibilia* 7.449a20-30 that every sensible object must be a magnitude.

(*telos*). With desire and *phantasia*, they can also have the impulse to move away from something diametrically opposed to that internal image representing their object of desire, that is, to flee from something taken to be a painful object.

As a result, it seems that an animal such a sea urchin can, for Aristotle, sense not only that it is currently in pain but also form an internal image suggesting that there is, for example, a fairly large, sharp, slowly moving, hard, and rough object causing that pain – what we would call a predator attacking the urchin. With some basic form of *phantasia* and desire, the urchin could form the desire to move toward something conforming to an internal image that conforms to the contrary properties of the object it takes to be currently causing its pain, that is, it can form the pulse to move toward an object that is blunt, smooth, and soft – what we would call "sand". Such an internal image of an object of desire would not have any particular smell or color or sound. In that sense, that object of desire is indefinite or indeterminate (ἀορίστως). Or, sensing a sharp, lingering, and unmoving pain inside itself (what we would call "hunger"), a sea urchin might well form the desire to move toward something conforming to an internal image that is sweet, soft, fairly small, blunt, slowly moving if moving at all, and succulent. It would not desire food that is loud or quiet, colorful or plain, odorous or fragrant. These objects of desire are, in comparison with those of complete creatures possessing all five senses, comparatively indeterminate. But their objects of desire have enough determinacy to guide the animal with a reasonably high success rate away from things that would harm it, and toward things that will help ensure its survival.[84]

[84] Note that in the first case, the object of desire is formed as it is because the urchin desires something that has roughly the contrary qualities of the object that the urchin senses to be currently causing its pain. In the second case, there might be some similar elements of causation in the formation of the urchin's object of desire: the pain of hunger might well be sharp, for example, and so the urchin desires something smooth. But it does not seem unreasonable to suppose that, in addition, the urchin has at least some highly

V. INDETERMINATE SELF-MOTION

How, exactly, does an animal without the ability to hear, smell or see move itself toward its object of desire, navigating through a purely gustatory and tactile world? How does it move toward an object conforming to its internal image of something that is, for example, fairly small, slowly moving if moving at all, smooth, succulent, blunt, and soft? I'll give a general description of what that indeterminate self-motion would look like to an external observer (such as one of us) with the help of a comparison with Aristotle's account of what it is to recollect (ἀναμιμνήσκεσθαι), especially in unfavorable circumstances. This is not to suggest, of course, that I think Aristotle necessarily intended such a comparison. Nor do I mean to suggest that the comparison admits of no imperfections. Rather, as I'll show, this comparison seems to be a helpful and conveniently Aristotelian way of shedding light on the process of indeterminate self-motion, that is, how an animal with basic capacities for desire, *phantasia*, and self-motion navigates through a purely tactile and gustatory world.

In *De Memoria*, Aristotle distinguishes recollection (ἀνάμνησις) from memory (μνήμης) and remembering (μνημονεύειν): memory or remembering is "the having of an image, related as a likeness to that of which it is an image" (*De Memoria* 1.451a16-17). Memory or remembering is "a function of the primary faculty of sense-perception, i.e. of that faculty whereby we perceive time" (451a18-19). Recollection "is not the recovery or acquisition of memory" (2.451a19-20); instead, Aristotle argues that "it is obviously possible, without any present act of recollection, to remember as a continued consequence of the original perception or other experience" (451a32). The act counts as recollection if and only

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basic capacity for memory, a capacity to not just form internal images but to retain them, such that the animal recalls some element of a similar painful (hunger) or pleasurable (consumption of food) experience in the past. Aristotle does not specify whether such creatures have memory. But he does think that "many animals have memory", and it is difficult to imagine an animal having desire and *phantasia* without any capacity for memory at all (*HA* I 1.488b25). Still, this assumption is not essential to my account of an incomplete animal's object of desire.

if, "one recovers some knowledge which he had before, or some perception, or some other experience, the state of which we above declared to be memory"; and, memory follows on recollection" (451b2-5). Unlike learning the same thing twice, or twice discovering the same fact, "recollecting must imply in those who recollect the presence of some source over and above that from which they originally learn" (451b8-10). When someone recollects, this is "due to the fact that one movement has by nature another that succeeds it" (451b11-12). So, when we recollect, "we are experiencing one of the antecedent movements until finally we experience the one after which customarily comes that which we seek" (451b17-18). This is why, when we recollect, Aristotle says, "we hunt up the series, having started in thought from the present or some other" (451b18). People recollect, Aristotle notes, sometimes "even without seeking to do so" (451b23). And it often happens that, "though a person cannot recollect at the moment, yet by seeking he can do so, and discovers what he seeks" (452a7-8). Recollecting is intentional or self-driven, Aristotle notes, only if the person can "move solely by his own effort to the term next after the starting point" without being guided by external assistance (452a6-8). Like self-motion, then, recollection is a self-driven and self-guided process.

But in particular, Aristotle's account of recollection, especially in unfavorable circumstances, bears some striking similarities to the *way* in which a creature with only touch and taste would move itself in search of pleasure and the relief from pain. In describing recollection, Aristotle has us imagine a series A B C D E F G H I (452a19-20). He says that "if the person recollecting does not remember at I, he remembers at E; because from E movement in either direction is possible, to D or F. But, if it is not for one of these that he is searching, he will remember by going to G, and so in all cases" (452a27-29). This will be much more difficult to do, Aristotle notes, when there are "badly arranged subjects" as

opposed to "things arranged in a fixed order, like the successive demonstrations in geometry" (451b33-452a2). Similarly, an animal without any of the distance senses and guided solely by an internal image with its object of desire along with whatever it is currently sensing will have a difficult time finding the object of its search. It must first try one object near to it, then another, and so on, without any guarantee that the next object will conform more to its internal image portraying the goal of its search, its object of desire. Like a sea urchin feeling a sharp pain from hunger or a large, forceful, sharp object from a predator outside itself, in someone trying to recollect "the mind receives an impulse to move sometimes in the required direction, and at other times otherwise" (452b3-4). The latter will presumably occur more frequently when recollection occurs with poorly arranged objects. Recollection, especially in unfavorable circumstances is by no means a neat or necessarily linear process; often "something else somehow deflects the mind from the right direction and attracts it to itself" (452b4).

Consider a sea urchin searching for what we would call plant or animal matter such as dead fish, mussels, sponges, or barnacles, and/or algae on coral and rocks. The urchin might well have an internal image, an object of desire that is relatively smooth and blunt, not painful, and perhaps somewhat succulent (if a dead fish tastes that way to an urchin). I suggest that, like a person trying to recollect something that is as yet indeterminate in some crucial respects, and where the relevant objects are poorly arranged, an urchin is searching for something that is indeterminate. Also, like the person recollecting under poor circumstances, there is nothing like a guarantee that the urchin will go in the right direction. Nor is there anything like a guarantee that the urchin will get progressively closer to the goal of its search.

A person recollecting under unfavorable circumstances will, Aristotle says, be unable to recollect at the moment, but by seeking for a while he can often and solely by his own effort come to the term next to his search. Such a person will, Aristotle notes, "set up many movements, until finally he excites one of a kind which will have for its sequel the fact he wishes to recollect. For to remember is the existence of a movement capable of stimulating the mind to the desired movement, and this, as has been said, in such a way that the person should be moved from within himself, i.e. in consequence of movements wholly contained within himself" (452a5-9). The person might wonder off course in the process of recollecting because "from the same starting-point a movement can be made in several directions, as, for instance, from C to B or to D" (452a24-25). While not necessarily *moving toward* the object of her recollection while she tries to recollect (for in fact she might often move further away from the object of her recollection), she does appear to always be *searching for* the object of her recollection. An urchin might have to move itself over a great many coral and rocks, requiring many movements, until finally it alights upon a coral or rock that has an object (such as a dead fish) that the creature senses as having the softness, smoothness, succulence, magnitude (and whatever other basic properties from its solely gustatory and tactile world) that conform to the internal image representing its object of desire.

To an external observer, in many cases the urchin would not appear to *move toward* a rock with a dead fish on it. Thus the urchin would probably not appear to be moving toward its object of desire. In fact, like the person trying to recollect under unfavorable conditions, the urchin would often appear to move further away from its object of desire. But the urchin is still *searching for* its object of desire. To the urchin, its the internal image it possesses, forming its object of desire, has properties such as softness, coldness, and other sensibles

conforming to what an external observer would call a dead fish. The goal in both cases (indeterminate self-motion in incomplete creatures, and recollection in unfavorable circumstances) is indeterminate, and the process in both cases is likely to be non-linear. To an external observer gifted with other senses such as sight, an incomplete animal might well appear to be meandering aimlessly. Similarly, to someone who completely understands what another person is trying to recollect in unfavorable circumstances, the person recollecting might well appear to be taking a route that is unnecessarily circuitous and error-prone. But both the person recollecting and the hungry urchin are nonetheless engaging in a self-guided – if comparatively indeterminate – search for something.

VI. CONCLUSION

I've sought to explain what Aristotle means when, after puzzling about the matter of motion in incomplete animals (those without sight, smell, hearing), he suggests in *De Anima* III 11.433b31-434a5 that just as incomplete animals are moved indeterminately (κινεῖται ἀορίστως), desire and *phantasia* are present in those animals, but present indeterminately (ἀορίστως δ' ἔνεστιν). This is the first focused, in-depth study of this specific problem. After explaining that and why Aristotle is interested here in voluntary self-locomotion in animals, I argued that Aristotle's specific view must fit under the following general description: self-motion and its directing faculties in incomplete animals differ in degree but not in kind from those of complete animals. I then examine how, exactly, an object of desire differs for an animal without any memories or *phantasms* involving sight, smell, and hearing. Finally, using my reconstruction of Aristotle's account of an object of desire for incomplete animals, as well as a comparison with Aristotle's account of recollection (especially in unfavorable circumstances) in *De Memoria*, I described the process of indeterminate self-motion.

I've not had space to address the specific mechanics of self-motion in incomplete animals. Corcilius and Gregoric (2013) give a plausible and extensively motivated model as a reconstruction of Aristotle's account of the mechanics of voluntary animal self-locomotion for the most obvious cases, that is, cases in which the animal senses an external object that is really there at the moment of appearing to the animal. Their Centralized Incoming and Outgoing Model (CIOM) of animal voluntary self-locomotion says that (1) an object is sensed by the animal, (2) this sensation produces an alteration, (3) there is a corresponding thermic alteration (heating for pleasure, chilling for pain) in the animal, (4) there is a contraction and expansion of connate air (quantitative change)/pulling and pushing (mechanical impulse), (5) there is a consistency alteration (solidification-hardening and liquefaction-softening) in the flesh around the joints in the animal, and (6) the mechanical effect of local motion of the limbs of the animal, resulting in displacement of the animal. C&G do not apply the CIOM to more complex and sophisticated cases such as human self-motion based on less obvious motives. Nor do C&G apply the CIOM to more basic cases of self-motion in animals possessing only touch and taste. But it might be interesting to apply the CIOM to the latter.

CHAPTER 7

ARISTOTLE ON HOW BIRDS FLY: EXTERNAL RESTING POINTS

Abstract: Aristotle argues animal self-motion is universally dependent on an external resting point. Without such a resting point, animals' efforts to run or fly or swim would be as ineffectual as someone trying to move a boat merely by blowing air while in the boat. It is easy to see that land-dwelling mammals need solid ground for self-motion. But what would Aristotle say about the differences between external resting points in cases of flight compared with cases of walking? How does air function as an external resting point, and how does its role differ from that of water and earth in cases of swimming and walking or running? These questions have escaped focus attention in the literature. I give an interpretation of Aristotle's explanation for why and how birds are capable of natural flight. I argue that, for Aristotle, air is a markedly different external resting point in comparison with water and earth, and nature has designed birds so as to take advantage of the unique way in which air affects the inequality between the given downward force and the given resistant force.

I. INTRODUCTION

We are, by now, quite clear on what makes animal locomotion a kind of self-motion why it is independent, autonomous, and self-directed in ways that other kinds of motion and change are dependent, other-directed, and reliant. We have also seen many important ways in which whether an animal can move itself, and how an animal moves itself, is not entirely or (in some cases) even partially in the animal's control. This chapter explores features of Aristotle's account of an especially concrete addition to the latter: in order to fly, swim, run, or move in any other way, an animal must be able to press down on a surface that exerts

force great enough to resist the downward force of the animal's weight and downward pressure.

Aristotle argues that an external resting point is necessary for animal self-motion. In order for an animal (human or non-human) to move itself from one place to another, "there must be something outside the animal which is unmoved, supporting itself against which that which moves is moved" (*De motu animalium* 2.698b12-14).[85] For, Aristotle argues, if the surface on which an animal tried to move were to give way, "as when tortoises walk on mud or men on sand, the creature will not advance, and there will be neither stepping, if the ground should not remain still, nor flying or swimming, if the air or the sea should not offer resistance" (698b15-17). That external resting point "must be other than that which is moved, and wholly different from the whole of it; and what is thus unmoved must be no part of what is moved. If not, it will not be moved" (698b18-20). Without such a resting point, animals' efforts to run or fly or swim would be as ineffectual as someone trying to move a boat merely by blowing air while in the boat: even a god such as Tityus or Boreas cannot move a boat in such a way. In *De incessu animalium* Aristotle gives a similar but less well-known account:

> The moving creature always changes its position by pressing against what lies below it. Accordingly if what is below gives way too quickly for that which is moving upon it to lean against it, or if it affords no resistance at all to what is moving, the latter can of itself effect no movement upon it. For an animal which jumps makes its jump both by leaning against its own upper part and also against what is beneath its feet (*De incessu* 3.705a8-15).

For Aristotle, "in general that which pushes down leans upon what is pushed down" (705a16-17). If that which is pushed down offers no resistance to the pushing then an animal cannot fly, jump, walk, swim, or move itself in any other way.

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[85] English translations of *De motu animalium* are taken from Nussbaum (1978).

It is easy to see that land-dwelling mammals need solid ground for self-motion. But what would Aristotle say about the differences between external resting points in cases of flight compared with cases of walking? How does air function as an external resting point, and how does its role differ from that of water and earth in cases of swimming and walking or running? Aristotle's biological works give plenty of descriptions of birds and their behavior. And in Aristotle's discussions of the natural motion of the elements, he has quite a bit to say about the natural motion of air in comparison with that of water, earth, and fire. But in describing this external resting point as a necessary condition for animal self-motion, Aristotle does not give any account of how air, something which is invisible to the naked eye, offers sufficient resistance for an animal not merely to fall more slowly than other creatures do but, rather, to lift off from the ground, climb into the sky, and fly for miles. Despite the literature helpfully addressing many interesting aspects of Aristotle's account of animal self-motion, there is as yet no focused treatment of Aristotle's account of the nature of physical, external resting points such as air required for animal self-motion such as flight.[86]

Using Aristotle's descriptions of birds, as well as his descriptions of air and how it functions as a resistant force in comparison with water and earth, I'll give an interpretation of Aristotle's explanation for why and how birds are capable of natural flight. I'll argue that, for Aristotle, air is a markedly different external resting point in comparison with water and earth, and nature has designed birds so as to take advantage of the unique way in which air affects the inequality between the given downward force and the given resistant force. I'll close with some remarks about how my discussion might shed some light on, first, Aristotle's anticipation of some aspects of modern fluid dynamics and aerodynamics, and, second, Aristotle's understanding of resting points in more general senses.

[86] See Berryman (2002), Corcilius and Gregoric (2013), Coren (2018), Freeland (1994), Furley (1978), Gill (1991), Meyer (1994), Morison (2004), and Waterlow (1982: 204-261).

II. THE AIR BENEATH BIRDS' WINGS

Aristotle argues that just as there will be no stepping (οὐδ' ἔσται οὔτε πορεία) if the ground does not remain still (εἰ μὴ ἡ γῆ μένοι), so too there will not be flying or swimming (οὔτε πτῆσις ἢ νεῦσις) *if* (εἰ) the air (ὁ ἀὴρ) or the sea (ἡ θάλαττα) would not offer resistance (μὴ ἀντερείδοι) to the thing trying to fly or swim. What does he mean by this? Aristotle holds that "the moving creature always changes its position *by pressing against what lies below it*" (*De incessu* 3.705a8-9, emphasis is mine). Aristotle seems to mean that birds press against air that lies below them in order to fly. The air below birds in flight provides the resistant force necessary for flight. Aristotle goes on to explain, "if what is below gives way too quickly for that which is moving upon it to lean against it, or if it affords no resistance at all to what is moving, the latter can of itself effect no movement upon it" (*De incessu* 3.705a9-11). We can infer, then, that on Aristotle's account the air below the bird in flight must not give way too quickly or afford no resistance at all to the weight of the bird and the downward force of the bird's wings. If the air below the bird does not provide the necessary resistance then the bird cannot use the air below it in order to fly.

The air is external and other than the bird, as is required of external resting points for any animal locomotion, on Aristotle's account: "there must be something outside the animal which is unmoved, supporting itself against which that which moves is moved" (*De motu animalium* 2.698b12-14). The air outside the bird, like any external resting point and resistant force "must be other than that which is moved, and wholly different from the whole of it; and what is thus unmoved must be no part of what is moved. If not, it will not be moved" (*De motu animalium* 2.698b18-20). Aristotle thinks that air is more easily divided than water (*De Caelo* iv 6.313b16-17). This difference is crucial to understanding why only birds are capable of flight. For, Aristotle says, "the smaller the quantity in each kind, the

more easily it is divided and disrupted" (iv 6.313b10-11). A quantity of air equal to a quantity of water or earth will be less effective as a resistant force than the water or earth. This is why, even though it is true in the case of water that "broad things keep their place because they cover so wide a surface and the greater quantity is less easily disrupted", for Aristotle "these considerations apply with greater force to air" (313b12-13, 15). Since air is less effective than water or earth as an external resting point, it requires less downward force (pushing down) on the resistant force (the air, the external resting point, the thing resisting the pushing down) in order to sink below the surface of the given quantity of air than it would for the same quantity of water or earth.

More precisely, Aristotle says that when it comes to the relation between the external resting point and that which is trying to move from one place to another, that is, between that which is pushing down and that which offers some resistance to the pushing down (e.g. between the bird and the air below the bird), there are, in general, two relevant factors: the downward force and the resistant force: "the force responsible for the downward motion of the heavy body and the disruption-resisting force of the continuous surface" (*De caelo* iv 6.313b17-18). There is, first, the force (βάρος) responsible for the downward motion of the heavy body (ἔχει τινὰ ἰσχὺν καθ᾽ ἣν φέρεται κάτω), such as the bird's weight (per surface area, that is, in proportion to the air below the bird) and, presumably, the downward force of the bird's wings (313b17-18). There is, second, the disruption-resisting force of the continuous surface (καὶ τὰ συνεχῆ πρὸς τὸ μὴ διασπᾶσθαι) (313b18-19). Aristotle says that there must be some ratio between the downward force and the resistance force, because they must come into conflict with one another (ταῦτα δεῖ πρὸς ἄλληλα συμβάλλειν) (313b19-20). Generalizing from Aristotle's account, for any given object (such as a bird), there are

three possibilities for the relation between the downward force (DF) exerted by the object and the given resistant force (RF) beneath and outside the object:

(1) DF is greater than RF: DF > RF

(2) DF is less than RF: DF < RF

(3) DF is equal to RF: DF = RF

Here's what Aristotle has to say about (1), (2), and (3):

For in proportion as the force applied by the heavy thing towards disruption and division exceeds that which resides in the continuum, the quicker will it force its way down (ἐὰν γὰρ ὑπερβάλλῃ ἡ ἰσχὺς ἡ τοῦ βάρους τῆς ἐν τῷ συνεχεῖ πρὸς τὴν διάσπασιν καὶ διαίρεσιν, βιάσεται κάτω θᾶττον); but if the force of the heavy thing is weaker [than the resistant force of the continuum] then the heavy thing will ride upon the surface [of the continuum] (ἐὰν δὲ ἀσθενεστέρα ᾖ, ἐπιπολάσει) (*De caelo* iv 6.313b19-21).[87]

Putting all of this together, if DF > RF, then an object such as a bird will, on Aristotle's account, sink below the surface of a continuum such as a given quantity of air below the bird. For the downward force of the bird will divide and disrupt the air beneath it. If, instead, DF < RF, then the bird will ride upon the surface of the continuum constituted by the air beneath it. Though Aristotle does not seem to address the possibility that DF = RF, it seems plausible to assume that if DF = RF then the object (e.g. a bird) will not sink below the surface of the continuum.

These three possibilities – DF > RF, DF < RF, DF = RF – and Aristotle's attendant distinctions discussed above are supposed to apply not just to birds and air but to all other kinds of continuums and objects. Some reflection on this fact will help to bring out how

[87] A standard translation, that of J.L. Stocks in the Barnes, gives "only if the force of the heavy thing is the weaker will it ride upon the surface" for the last clauses of this passage. But I see no good reason to assume that "only" is implied in the Greek. Moreover, it seems odd for Aristotle to stipulate that if DF = RF then the heavy thing will sink below the surface of the continuum. Yet that would be implied by Stocks's translation. For if the *only* way a bird can ride on the surface of a continuum such as air is if the resistant force of the air is greater than that of the downward force of the bird, then it logically follows that the bird will not ride on the surface of the air if the force of the bird is equal to the force of the air beneath it.

Aristotle would explain that not just the comparative lightness of birds but also the shapes of their wings are naturally suited for their purposes. Aristotle begins *De caelo* 6 by arguing that the shapes of bodies (σχήματα) are not responsible (οὐκ αἴτια) for the actual downward or upward direction of their motion (τοῦ φέρεσθαι ἁπλῶς ἢ κάτω ἢ ἄνω), but, rather, for making their motion faster or slower (ἀλλὰ τοῦ θᾶττον ἢ βραδύτερον) (313b14-15). And Aristotle's first examples are not birds or air. He discusses why some objects float on water and others sink. Why do flat objects of iron or lead float on water, even though they are heavy? Why do less heavy but smaller objects, such as needles, sink in water? Why do other small objects such as metal filings and other earthy or dust-like particles float? More generally, Aristotle addresses the following problem: why are there many observable cases where two objects have precisely or at least roughly the same heaviness and yet one of the objects floats whereas the other object sinks? Aristotle mentions Democritus's explanation: the heat-particles rising from the water bear up flat heavy bodies, whereas the narrow fall through, because only a few of those particles oppose them. Aristotle rejects Democritus's explanation. For he points out that if Democritus is right about water then his explanation should apply to air too, that is, we would expect more of the same to happen with air. But Aristotle implies that absurdities would follow. In getting clear on Aristotle's alternative explanation, we would do well not to make the same mistake Aristotle takes Democritus to have made, namely, giving an explanation that works well for one element but not for another. So, in the discussions that follow, I'll pay attention not just to how Aristotle's account works for birds in flight but also objects in or on water.

We should also consider that Aristotle's descriptions of air, water, continuums, external resting points, and the relation between the given downward force and the given upward force are supposed to apply not just to the movements of living, natural things such

as birds and fish but also to the movements of non-natural objects. We've seen that if DF > RF (or, for Aristotle, if DF = RF), then the heavy thing will force its way down. And we've seen that the rate at which the heavy thing forces its way down is relative to the degree to which DF is greater than RF: "in proportion as the force applied by the heavy thing towards disruption and division exceeds that which resides in the continuum, the quicker will it force its way down" (313b18-20). Aristotle does not seem to have an explicit or obviously implicit explanation for why one and the same heavy thing will hit the ground with much greater force when dropped (or when it falls) from a much higher point above the ground than when it is dropped (or when it falls) from a much lower point above the ground.[88] Perhaps he would say that once a quantity of air beneath an object has been disrupted, the quantities of air beneath that quantity are progressively more easily disrupted, resulting in the object falling at a progressively faster pace and with progressively more force. But his account does seem to explain why heavy things without wings or some wing-equivalent structure fall much more quickly than (a) less heavy things without wings or any wing-equivalent structure and (b) equally heavy things that have some wings or some wing-equivalent structure. Aristotle's explanation would be something like the following: in the case of a grand piano dropped from the eighth floor of an apartment building, it's true that DF > RF; but, it's also true that, for example, DF = RF x 12.7 (or, equivalently, DF divided by 12.7 = RF). It's true that DF = RF x 12.7 because, first of all, the grand piano is constituted primarily by materials similar in constitution to earth – a naturally downward moving element, for Aristotle – in a particularly dense way, without much air (and obviously no fire) or naturally upward moving elements in the piano. So, the piano is extremely heavy, adding significantly to its downward force. Second, the piano does not occupy a very large surface area relative to its heaviness,

[88] For more on Aristotle's account of projectile motion, see the helpful discussion in Golitsis (2018).

such that the quantity of air below the piano's downward force is nowhere near enough to successfully repel its downward force. Third, air is more easily divided than water or earth, so that if the piano were dropped onto water or earth then the piano would not drop nearly so quickly; it is precisely when the piano hits the earth that it generally stops dropping because earth is much less easily divided than is air.

So, without a modern theory of gravity, Aristotle would explain the fact that humans and other such objects normally (notwithstanding tornadoes, hurricanes, and other such things) remain on the ground rather than floating up into the sky by arguing that the downward force exerted by our heaviness is usually much greater than the resistant force of any air beneath us. This, on Aristotle's account, is due not just to our own heaviness, but also to the fact that our being positioned on the ground entails that there is not much air directly beneath us at any given time, as well as to the fact that we do not have wings or any wing-equivalent structure that drastically increases our surface area relative to our heaviness, and which allow us to effectively push down on a large quantity of air. It is almost always the case that for a human being walking to work, DF > RF, and DF = RF x some appropriately high positive integer. Thus, as Aristotle is well aware, when birds fly, and especially when birds are trying to take off, they quickly and forcefully raise their opened, extended wings up and then push their wings down. On Aristotle's account, in moving their wings in this way the bird is pushing down against the resistant force of the air-continuum, the external resting point, beneath the bird.

Aristotle thinks that water is less easily divided than air. (It turns out that water has much greater viscosity than air – Aristotle got this right.) So, water is, all else equal, more effective than air as an external resting point. Aristotle would say, on my reading, that this explains why fish, boats, swimmers, and other objects in and/or on water can be – and are,

in general – a great deal heavier (per surface area) than birds, and yet remain suspended in or on water without falling much below the surface of the water. It takes more heaviness, more downward force to ensure that DF > RF when the resistant force is water than when it is air. With more resistant force provided by the water, boats and swimmers and fish can exert a large amount of downward force and, as long as their weight and total downward force is sufficiently broad and spread out (as Aristotle's examples and analysis show for objects such as a flat piece of iron) the given quantity of water beneath the object will support the object and resist the object's downward force. Something similar happens in the case of air, except that, since air-continuums are always more easily disrupted, birds must be lighter and must spread out their weight more than, for instance, a swimming human being must do with water. This, Aristotle would point out, helps to explain why a grand piano falls much more quickly when falling through air than when sinking in water. Presumably the piano is too heavy for the resistant water beneath it, just as it is too heavy for the resistant air beneath it. That is, in the piano-air case and piano-water case, DF > RF. But the reason the piano sinks so much more slowly in water than it falls through air, the reason that heavy objects generally either float or sink slowly in water whereas they tend to crash violently through air is that the air beneath the piano (or any heavy object) is much easier to disrupt than the water beneath the piano (or any heavy object).

We've seen that Aristotle draws some distinctions between continuums of air and continuums of water: air is more easily divided and more easily reforms continuums, so that water provides a more stable resistant force. Aristotle also draws some important *parallels* between water and air, their functions in animal locomotion, and, especially important, the ways nature has structured fish and birds so as to take advantage of the way water and air function as resistant forces or external resting points. He notes that "there is a broad

similarity between birds and fishes: birds have their wings on the superior part, similarly fish have two pectoral fins; again, birds have legs on their under parts and most fish have fins on the under parts and near the pectorals. Birds, too, have a tail and fish a tail-fin" (*De incessu* 18.714b2-5). Aristotle firmly – and, indeed, axiomatically – holds that nature does nothing in vain; everything that nature does is done for a specific purpose. One conveniently placed formulation (among a great many throughout the Aristotelian Corpus): "Nature's workmanship is never purposeless, but everything for the best possible in the circumstances" (*De incessu* 12.711a16-17). The reason that birds have wings and fish have fins in the particular ways they do is so as to exert the right amount of downward force in the right way on the resistant force of water (for fish) or air (for birds): "Among birds the wings are attached obliquely; so are the fins in water animals, and the wings of insects. In this way they draw together[89] and divide the air or water most quickly and with most force" (*De incessu* 15.713a10-12). Aristotle says in this crucial passage that wings and fins are both used for the purposes of drawing together (συστέλλοντα) and pushing against the air or water. The drawing together presumably occurs when the animal raises its wings or fins. As its wings or fins are raised, a comparatively large quantity of air or water is pulled beneath the wings or fins.[90] In Aristotle's view, it is for this reason that wings and fins cover a large surface area but are comparatively thin (that is, compared with the rest of the body) in animals such as fish, insects, and birds. Nature has given animals these appendages obliquely, as Aristotle notes, so that the animal can use its wings or fins to first draw together an effective resistant

[89] A.S.L. Farquharson, in the *De incessu* English translation in the Barnes, omits the words συστέλλοντα καί ("draws together and") from the MS but does not explain why this is done. I think these words should not be omitted, since they help to explain what Aristotle means: if the air-continuums and water-continuums were just divided and never drawn together, it's not clear how the animal would generate the pushing-off force that Aristotle describes here and in more detail in *De motu animalium*. Rather, Aristotle's idea is that the animal draws the air or water together and then, pushing down, exerts a large amount of downward force against the resistant force, creating a pushing-off effect and movement.

[90] As I'll discuss in more detail shortly, Aristotle holds that all motions are combinations of pushings and pullings; see, for instance, *Physics* VII 2.

force and external resting point (a comparatively large quantity of air or water). Aristotle observes that if birds stood erect the way human beings do then its wings would be "as useless as the wings of Cupids we see in pictures" (*De incessu* 11.711a1-2). With that considerable external resting point and resistant force drawn together by the bird's wings or fish's fins, with that comparatively large quantity of air or water beneath the animal, the animal forces its wings or fins with a large amount of downward force onto the air or water and pushes against that continuum to lift itself into the air and, when it desires, to maintain or increase its height or speed when flying. In this way, the animal is able to effectively use the external resting point as a pushing-off point for the animal's motion.

Aristotle draws other interesting parallels between birds and fish and the way they are designed to move through water and air, respectively: Aristotle says that a bird's tail feather functions like a ship's rudder to keep the flying thing in its course (*De incessu* 10.710a3-4). As a result, Aristotle argues that it is because flying insects have absolutely no tail "that they drift along like a rudderless vessel" (710a7-8). And he argues that insects' flight is "slow and frail" and "like a cargo boat attempting to make its voyage with oars" because the character of their wings is not proportionate to the bulk of the insects' bodies (710a16-18). He says that "the strong and acute breastbone" of swiftly flying birds, those with curved talons, is "like the prow of a clipper-built vessel", that is, compact and strong (710a30-31), though birds have hollow bones. Both the prow and the breastbone are built so as to effectively push away the air (in the case of the breastbone) or the water (the prow) that beat against the prow or the breastbone (710a31-b1).

Aristotle argues that all forms of locomotion are reducible to pushing (ὦσις) and pulling (ἕλξις) (*Physics* VII 2). Pushing on, pushing in, pushing off, throwing, carrying, twirling, and all other such motions can in Aristotle's view be reduced to pushings and/or

pullings. Though Aristotle does not apply his analysis of the role of pushing and pushing in locomotion specifically to flight in birds (or swimming in water-dwelling creatures), it seems likely that he would say that the raising of the animal's wings or fins is primarily a pulling. Through that pulling, the air or water is drawn together beneath the wings or fins. For Aristotle argues that inhaling is a kind of pulling, and it seems that a similar process occurs when an animal inhales (*Physics* VII 2.243b11-12). That is, the animal draws in a quantity of air through the animal's mouth (and/or nose and/or gills). With inhaling, the lungs and rib cage expand to pull in and make room for the larger quantity of air drawn into the animal's lungs. The air is drawn together in the animal's lungs. With the raising of the wings, the bird's wings pull a comparatively large quantity of air (large in comparison to the heaviness of the bird) beneath the bird, and the air is drawn together beneath the bird's wings. It also seems likely that Aristotle would say that the lowering of the animal's wings (or fins) is a kind of pushing. For he argues that exhaling is a kind of pushing, and it seems that a similar process occurs when an animal exhales (*Physics* VII 2.243b11-12). The bird (or water-dwelling animal) contracts its wings (or fins) and forces its wings (or fins) downwards, creating a comparatively large amount of downward force (large in comparison to the heaviness of the animal and the continuum or air or water beneath the animal's wings or fins and the rest of the animal's body). When exhaling, an animal's lungs and rib cage contract, pushing the air out of its body. Natural flight in birds, then, consists in a series of pullings (as the bird raises its wings) and pushings (as the bird forces its wings downward, mechanically similar to the series of inhalings and exhalings that animals continuously depend on in order to survive). Something mechanically similar occurs when a water-dwelling creature raises its fins and then forces its fins downward. For Aristotle, nature has designed flying and swimming animals so as to exploit the peculiarities of water and air as external resting points

with respect to the shape and placement of their wings and fins, that is, the animal's wings or fins are broad, strong, relatively flat, and placed obliquely on the animal's body.

There is no essential difference, Aristotle argues, between pulling or pushing a great weight or a small weight; the same principles apply whether the motion in question is spitting, coughing, inhaling, exhaling, an elephant running, a whale swimming, or a person in a boat trying to move in a certain direction (*De motu animalium* 4.700a23-25). Not only are all of these motions reducible to pushing and pulling, but, also, in all of these cases the thing in motion must press against an external resting point outside it. Without water, air, earth or some otherwise-constituted external resting point against which the animal or boat can push off and exert resisted force, the animal or boat cannot move (or at least not in the direction desired). Without a sufficiently resistant resting point outside the animal or boat, the animal or boat would, Aristotle argues, be like a person trying to move a boat from inside the boat without pushing against anything outside the boat. If the person in the boat does not push off against water (using an oar), the dock, the shore, the bottom of the river, the air (using a sail) or some other effective resting point entirely outside the boat, there is no way for the person in the boat to move the boat in any desired direction. The person in the boat will simply be at the mercy of the water, wind, and any external objects affecting the motion of the boat:

Evidence of this lies in the problem why it is that a man easily moves a boat from outside, if he pushes with a pole, putting it against the mast or some other part, but if he tried to do this when in the boat itself he would never move it. No, not even Tityus himself nor Boreas blowing from inside the ship, if he really were blowing in the way painters represent him; for they paint him sending the breath out of himself. For whether one blew gently or so stoutly as to make a very great wind, and whether what were thrown or pushed were breath or something else, it is necessary in the first place to be supported upon one of one's own members which is at rest and so to push, and in the second place for this member, either itself, or that of which it is a part, to remain at rest, fixing itself against something external to itself. Now the man who is himself in the boat, if he pushes, fixing himself against the boat, does not move the boat, because what he pushes against must remain at rest. Now what he is trying to move, and what he is fixing himself against is in his case the same. If, however,

he pushes or pulls from outside he does move it; for the ground is no part of the boat (*De motu animalium* 2.668b24-669a11).

In all cases of self-motion, whether the particular self-mover is a whale swimming in the ocean, a bird flying in the air above or an elephant running on the ground many miles away, there must be a resting point outside the self-mover. That resting point must provide an adequately forceful resistance against the downward force of the self-mover's wings, fins or legs, together with the heaviness of the animal's body.

There is, however, a crucial detail that has not yet been addressed: the curvature and flexion of birds' wings. Nowadays we understand that wings in both planes and airplanes are airfoil shaped with a curved upper surface to ensure that there is faster airflow moving over the top of the wing that there is moving under the bottom of the wing. Since, by Bernoulli's Principle, the faster moving air moving over the top of the wing has lower pressure than the slower moving air moving under the wing, air is pushed downward and lift is created. A flat wing on a bird or an airplane would not create as much lift. But it might not seem initially clear how Aristotle would respond to the following objection: When a bird raises its wings, drawing together and pulling a quantity of air underneath its wings, isn't it also pushing against air above its wings? True, there is a drawing together of an air-continuum beneath the bird's wings when it pulls its wings up, but there is also a pushing-off against the air above the bird's wings, and that should result in a neutralization of any force or pushing-off motion created by the bird.

One way we might imagine Aristotle responding to that objection would run as follows. Aristotle holds that air (ἀὴρ) is light and naturally moves up to a place higher than anything other than fire (since fire, unlike air, is absolutely light), whereas water (ὕδωρ) and earth (γῆ), the two heavy elements, naturally move down. Water and earth naturally move

towards the center of the earth, which also happens to be the center of the cosmos, whereas air and fire naturally move away from the center. Ether, the weightless element that occupies the supralunary region of the cosmos, naturally moves around the center.[91] Whereas fire has no weight and earth has no lightness, such that fire is absolutely light and earth absolutely heavy, air is not absolutely light and water is not absolutely heavy (e.g. *De Caelo* iv 4.311a15-30). So, air naturally provides an upward force. That upward force is presumably what, in general, Aristotle means when he says in *De motu animalium*, "there will be neither stepping, if the ground should not remain still, nor flying or swimming, if the *air* or the sea should not *offer resistance*" (2.698b16-17, emphases are mine). So, the reason that birds' raising their wings does not result in their pushing themselves down, against the air on top of their wings, just as much as they are able to push off the air below their wings, is that the air below their wings naturally moves. We don't get the neutralization described in the objection.

But there are problems with responding to the neutralization-objection solely by appealing to Aristotle's account of the natural upward motion of air. For one thing, we've seen that Aristotle notices many parallels between birds and fish, wings and fins, and between animal locomotion in air and animal locomotion in water. But water naturally moves downwards, unlike air. Water moves in the opposite direction. If this response to the objection is right, then it seems that, for instance, when the powerful caudal fin (tail fin) on a whale moves downward in water, it is encountering less resistant force than when it moves up. For, when its tail fin moves upward, its fin meets the resistant force of downward moving water. So, whales should move downward, all else equal, when they move their tail fin up and down. But this is not what happens, and Aristotle observes that this is not what

[91] See *De Caelo* i 3 for a summary of this part of Aristotle's theory.

happens when the many water-dwelling creatures described in his biological works move their tail fins up and down.

Instead, I suggest that we respond to the neutralization-objection by appealing primarily not to Aristotle's account of the natural motion of the elements (though this might indeed be a contributing factor in Aristotle's understanding of how birds fly), but, rather, to Aristotle's descriptions of the curvature and natural flexion of birds' wings. For he observes, "birds have the flexions of their limbs like those of the quadrupeds; for, although bipeds, birds bend their legs backwards, and instead of arms or front legs have wings which bend frontwards" (*Historia animalium* II 1.498a29-30). With their wings bending frontwards rather than backwards, birds such as quails and partridges are able to effectively "gather their brood under their wings" (*Historia animalium* IX 8.613b15-16). With the flexion and structure of their wings, birds such as cranes can "sleep with their heads under their wing" (IX 10.614b23-24). More saliently, with the joints in birds' wings structured such that they bend and flex frontwards and downwards rather than backwards or upwards, they form a downward arc but not an upward arc. That creates an important inequality between what happens to the air above a bird's raising wings and what happens to the air below. As we've seen, Aristotle argues that wings are both used for the purposes of drawing together (συστέλλοντα) and pushing against the air (*De incessu* 15.713a10-12). The drawing together occurs when the bird raises its wings. Aristotle might well point out, against the neutralization-objection, that with its wings flexing and bending frontwards and downwards, the bird pulls, traps or 'cups' (so to speak) the air beneath its raising wings. With its wings incapable of flexing in the opposite way, namely, backwards and upwards, the bird does not create an upward-facing arc with its wings. So the bird's wings are not anywhere near as effective at drawing together air-continuums above its wings. But the neutralization-

objection does not take into account the downward-facing arc created as the bird raises its wings. The objection assumes that the drawing together (συστέλλοντα) of the air above the bird's wings will be just as significant as the drawing together of the air below its wings. I suggest that Aristotle would point out that the objection has made a significant and clearly false assumption.

III. CONCLUSION

I've addressed a topic as yet unexplored in the literature on Aristotle's natural science, namely, how Aristotle would explain flight in birds and, more generally, how Aristotle understands the nature of physical, external resting points for animal self-motion. It seems to me that the interpretation I offered here is not just plausible as a reading of Aristotle's views but also helps to show some additional, noteworthy ways in which Aristotle anticipated some aspects of modern scientific understandings in physics. Consider, for example, concepts such as lift-induced drag and parasitic drag, parts of what we today call 'aerodynamic drag' or 'fluid dynamic drag'. It has been noted that Aristotle was the first to state and explore reasons for and consequences of the fact that there is resistance that acts on a body passing through air or another fluid (Anderson 1997: 17). But by getting much clearer as to how Aristotle understands air as a resistant force, we can also get clearer on how Aristotle's views anticipate some aspects of our modern understanding of aerodynamic drag or fluid dynamic drag. For example, John Anderson argues that since Aristotle was the first to argue that bodies set in motion in a vacuum always eventually come to rest and so there must be a resistance acting on the body, we can understand one of Aristotle's main contributions to aerodynamics "was the idea that a moving body passing through the air or another fluid encounters aerodynamic 'resistance' (ibid.)". But we've seen that and why Aristotle thought that it is precisely because elements such as air offer resistance of a certain

kind and in a certain ratio to the given downward force that motion such as flight is possible and flying animals are structured in the particular ways they are. It seems to be true Aristotle understood that air offers resistance to a body passing through air, and so in some highly general sense may well have been the first thinker (before even Archimedes) to formulate more inchoate versions of modern principles of aerodynamics and fluid dynamics. But, in addition, it seems that Aristotle understood that the fact that air offers resistance to bodies passing through air, as well as the precise way in which air offers resistance relative to the proportions, shape, mass, and density of the given object, helps to explain how and why flight is possible, why birds have wings that bend and flex frontwards and downwards, why birds have tail feathers, and other facts.

Also, it seems to me that by focusing on this part of Aristotle's account in the ways I suggest, we can get a little clearer about why Aristotle argues that reflecting on the nature and necessity of external resting points can help us understand the motion and march of the universe: "But the point of rest in the animal is still quite ineffectual unless there is something outside it which is absolutely at rest and immovable. Now it is worth while to pause and consider what has been said; for it involves a speculation which extends beyond animals even to the motion and march of the universe" (*De motu* 2.668b9-10). What does Aristotle mean by this? One way to understand Aristotle's point is that there must be an ultimate cause of motion in the universe, and that first mover must be unmoved. If it were self-moving then it would require an external resting point for its motion, so that it would not really be the first cause of motion. So, Aristotle might mean that understanding why there must be external resting points for self-motion can help us understand why, contra Plato, the ultimate source of motion must be an unmoved mover rather than a self-mover.

CHAPTER 8

PLATO VERSUS ARISTOTLE ON INVOLUNTARY MOTIONS AND SELF-MOTION

Abstract: It has been noted that Aristotle's discussion of involuntary motions in some sense follows Plato's original discussion in the *Timaeus*. But studies of what, specifically, Aristotle borrows from Plato, what Aristotle introduces that is new, and how Aristotle's analysis of the problem of involuntary motions differs from Plato's have escaped detailed attention in the literature. Attending to these differences can, I argue, shed light on the bases of deeper divergences between Aristotle and Plato, especially with regard to their views on self-motion and the origin of all motion and change. I argue that whereas for Plato the origin of involuntary motions is in the animal, for Aristotle the origin is in the animal's environment and, second, Aristotle recognizes the role of involuntary motions in self-motion whereas Plato does not. These distinctions help to explain, I argue, why Aristotle adopts a qualified notion of self-motion whereas Plato's notion is unqualified, and why Aristotle argues for an unmoved mover rather than a self-mover as the origin of all motion. I close by discussing the broader philosophical interest of the connections between involuntary motions and self-motion, especially for our modern notions of autonomy and responsibility.

I. INTRODUCTION

There is a convenient sense in which this chapter ties together the whole of this dissertation. For it is squarely focused on the independence-dependence *compatibilism* of Aristotle's account of animal self-motion. We've seen that Aristotle argues that flight, swimming, running, and other forms of locomotion in animals count as self-motion. Animal locomotion is autonomous, independent, and self-directed in important ways in which other kinds of natural changes are not. So, animal locomotion is up to the animal. But natural

elemental motion, for example, is not up to the elements. Nor are growth and metabolism in plants up to the plants. We've also seen that, for Aristotle, animal motion is not *just* up to the animal. Rather, its ability to move itself, as well as how it moves itself, depend on many factors, processes, and motions that are not under the animal's continuous or direct control. On Aristotle's account, then, there seems to be no hint of contradiction or tension in maintaining that animals move themselves while also being moved by many things outside their control. In fact, he sees it as both empirically and philosophically confused (and leading to dubious theoretical implications) to hold that animal self-motion springs out of, depends on, and is shaped by nothing other than the animal itself and what is under the animal's direct and continuous control. In the present chapter, we see a nice illustration of this compatibilism in Aristotle's account, made sharper by a contrast with a feature of Plato's account. Aristotle takes it as clear and important that animal self-motion depends on, and is in some cases shaped by, involuntary motions such as a quickening of the animal's heart rate or an arousal of an animal's sexual organs or the energy-sapping process of digesting a big meal. Though Plato has an interesting discussion of involuntary motions, Plato does not (unlike Aristotle) connect his account of involuntary motions with his account of self-motion. We'll see that this divergence has some wide-ranging consequences.

Aristotle says in his *Physics* viii 6 that animals are capable of changing themselves with respect to one kind of change (ὅτι μίαν κίνησιν αὐτὰ κινεῖ). By one kind of change, in this context, Aristotle means voluntary self-locomotion, that is, running or flying or swimming from one place to another. But even this type of change, he says, is not strictly (οὐ κυρίως) a self-change (259b6-7). For, he argues, the explanation (τὸ αἴτιον) of the change is not from the animal itself (οὐ γὰρ ἐξ αὐτοῦ) (259b7-8). Instead, many conditions for the animal's voluntary self-locomotion are not satisfied voluntarily but rather involuntarily or non-

voluntarily. Growth, wasting away, breathing, digestion, factors such as food sources in the animal's environment, and sexual arousal occur naturally in animals (φυσικαὶ τοῖς ζῴοις), occur during rest and movement, and are sometimes and in some senses not just necessary for but also directive of self-change (259b8-10). Yet animals are not responsible for or in command of those factors (οὐ κινοῦνται δί αὑτῶν) (259b10). Animals are not in control of the presence of attractive mates and viable sources of food in their environments. Nor are animals in control of how long it takes their bodies to digest food that they have recently consumed; Aristotle notes that animals often sleep while they are digesting and, then, once they are awake, they become self-movers (259b11-12). Nor, again, are animals responsible for their own respiration.

By changes that are involuntary (ἀκουσίους), Aristotle means those of the heart (e.g. increased heart rate when the animal is afraid), those peculiar to the sexual organs (e.g. the penis becoming erect before the animal mates), and all movements that occur when something appears (φανέντος τινός) but without the command of thought (τοῦ νοῦ) (*De motu animalium* 11.703a5-7). By changes that are non-voluntary (οὐκ ἑκουσίους), he means those such as sleep, waking, digestion, breathing, and all others where neither *phantasia* (an internal image-forming capacity sometimes translated "imagination" but more often just transliterated due to the inadequacy of "imagination" and other convenient English translations) nor desire (ὄρεξις) is, strictly speaking, in control (*De motu* 11.703a7-10).

Strikingly, Aristotle says that parts such as the heart and the penis exhibit involuntary motions most conspicuously because each of the parts is like a separate living creature (δία τὸ ὥσπερ ζῷον κεχωρισμένον ἑκάτερον εἶναι τῶν μορίων) (*De motu* 11.704a21-22). In a sense, then, on Aristotle's account, when an animal voluntarily moves itself toward an object of pleasure or away from an object of pain, separate living creatures within the animal move

the animal. He says that the heart contains the origins (τὰς ἀρχὰς) of the senses (τῶν αἰσθήσεων), and that, in the case of the generative part of an animal, "the force of semen comes forth from [the penis] like a kind of living creature" (*De motu* 11.704a24-26). The animal is no more in control of those parts than it is in control of separate living creatures. Yet those parts are active during the animal's voluntary self-locomotion, and in some important senses those parts help to drive and explain the animal's motion. For example, because a rabbit perceives a fox running toward it, the rabbit becomes afraid without intending to become afraid, and the fear causes the rabbit's heart to beat faster. With an elevated heart rate, the rabbit is able to run faster so as to escape the fox. Or, perceiving that an attractive doe seems willing to mate with a buck, the buck's heart rate will increase and its penis will become erect so as to impregnate the doe. There are countless similar examples in Aristotle's vast biological works. These movements are crucial: without effective motions in mating rituals and impregnation, species cannot reproduce. And without at least sometimes successfully evading predators, many species cannot survive. The mating and evading as a whole are voluntary motions, but the elevation of the heart rate and the erection of the penis are involuntary motions that help to cause the voluntary self-locomotion of the animal.

It has been noted that Aristotle's discussion of involuntary motions and, in particular, his comparing involuntarily moving parts to separate living things inside the animal, in some sense follows Plato's original discussion of involuntary motions in Plato's *Timaeus* (e.g. Gregoric & Corcilius 2013: 84). But studies of what, specifically, Aristotle borrows from Plato, what Aristotle introduces that is new, and how Aristotle's analysis of the problem of involuntary motions differs from Plato's have escaped detailed attention in the literature on Aristotle's accounts of notions such as self-motion, desire, and

voluntariness.[92] Attending to these differences can, I argue, shed light on the bases of deeper divergences between Aristotle and Plato, especially with regard to their views on self-motion. I begin with an analysis of relevant passages from Plato's *Timaeus* so as to bring out Plato's account of involuntary motions (Section II). I argue that among the divergences between Aristotle and Plato in this context, the two most significant are, first, that whereas for Plato the origin of involuntary motions is in the animal, for Aristotle the origin is in the animal's environment and, second, that Aristotle recognizes the role of involuntary motions in self-motion whereas Plato does not (Section III). I explore some implications of this distinction, focusing especially on its use in helping to explain some aspects of Aristotle's arguing for anti-Platonic, heavily qualified, but firmly upheld self-motion (Section IV). I close by discussing some broader philosophical implications, especially for our notions of autonomy and responsibility (Section V).

II. PLATO ON INVOLUNTARY MOTIONS

Near the end of Plato's *Timaeus*, we are told that the gods created the desire for sexual union in men and women by creating in men and women an ensouled (ἔμψυχον) living thing (ζῷον), one in men, or, as described in the text, one ensouled living thing in "us" (ἐν ἡμῖν), and another in women (ἐν ταῖς γυναιξὶν) (91a2-3). There follows a colorful description of how, precisely, the gods made this ensouled living thing in men and in women. We also find descriptions of how male and female genital systems are structured so as to make us both deeply desire and, in an important sense, require release and spreading of seed (in the case of men) or to become fruitful (in the case of women). The aspect of Plato's account to which I want to draw special attention is that the involuntary motions of sexual

[92] See, for instance, Berryman (2002), Broadie (1982: 204-261), Coope (2015: 245-264), Freeland (1994), Furley (1978), Gill (1994), Gregoric and Corcilius (2013), McGinley (1980), Meyer (1994, 2006), Morison (2004), Moss (2012), Müller (2015), and Pearson (2012).

parts and corresponding desires in men and women have their primary origin within the individual rather than outside the individual. I'll emphasize later on that, for Aristotle, the involuntary motions of sexual parts and corresponding desires have their primary origin outside the individual. To be clear, I do not mean to endorse the accuracy of any of the claims in this passage; in fact, by our standards, many of the claims are remarkably inaccurate and, in some cases, sexist. I am interested, rather, in reconstructing Plato's account of involuntary motions in (human and non-human) animals, in tracing the differences between his account and Aristotle's, and in exploring some implications of those differences.

We are told that the gods made the ensouled living thing in man by constructing a passage (διέξοδον) by which fluids exit the body (91a4). There it receives the liquid that has come through the lungs, down into the kidneys, and on into the bladder (91a4-6). Under pressure of air, the liquid is expelled from the passage (91a6). The gods bored a connecting passage into the compacted marrow that runs from the head, along the neck, and through the spine (91a7-b1). The text says that this marrow is what was previously called 'seed' (σπέρμα) (91b1-2); presumably what is meant is the *Timaeus* 73c1 and 74a4, where σπέρμα is described in similar terms. Since (ἅτε) the seed has soul (ἔμψυχος) in it, and since the seed has now found a way to vent, the marrow gives a life-giving desire (ζωτικὴν ἐπιθυμίαν) for emission at the precise location where the passage allows venting or efflux. Through this life-giving desire comes the love (ἔρωτα) of making offspring or procreation (τοῦ γεννᾶν ἀπετέλεσεν) (91b2-5). We are told that this is the reason why the male genitals are self-ruled or self-willed (αὐτοκρατὲς) and unruly or disobedient (ἀπειθές) (91b5-6). What does Plato mean by self-willed and unruly? He compares these features to an animal that will not be subject to reason (οἷον ζῷον ἀνυπήκοον τοῦ λόγου) and, driven crazy by its desires, tries to control everything else (πάντων δι᾽ ἐπιθυμίας οἰστρώδεις ἐπιχειρεῖ κρατεῖν) (91b7-8).

Note that, in this explanation of sexual desire and procreative drive in men, the primary origin is internal rather than external. The male sexual organs are part of a separate, ensouled living thing within the man. That separate, ensouled living thing within the man is disobedient, unruly, self-ruling, and self-willed. It is described as having a life and will of its own, separate from that of the rest of the man. Like an animal driven mad by its desires, it is not subject to reason. In that sense, it is clearly moved involuntarily. So, while we can note here the absence of Plato and Aristotle's favorite descriptors for voluntary and involuntary motions, namely, ἑκουσίους and ἀκουσίους (used often in Plato's works such as the *Laws* and the *Republic*, and in Aristotle's *Nicomachean Ethics, Eudemian Ethics, Politics*, and so on), it seems safe to infer from the language in this passage (e.g. αὐτοκρατὲς or "self-willed," ἀπειθές or "disobedient," and ensouled (ἔμψυχον) living thing (ζῷον)) that movements of the male sexual organs count as ἀκουσίους (involuntary movements). The movements of the male sexual organs are described as requiring venting in a very physical and literal way. Men, as a result, have a deeply embedded desire to send forth their life-giving seed or marrow. What men are described as coming to love, as a result of this need and deeply embedded desire, is making offspring and procreating, sending forth their seed through the passage and thus fulfilling their life-giving desire; men are not described as wanting to spread their seed because of something outside them, something in their environment. Nor are men described as coming to love a particular woman, a mate and partner, as a result of this desire. The origin of this male desire for procreating and for all the movements of the male sexual organs is described as entirely internal, within the man, not external. Its effects, of course, are primarily external: procreation for human beings requires a mate who receives the man's seed. But in this description, the origin of the male desire for procreation is primarily internal.

Similarly, the movements of the female sexual organs are described in a way that makes them sound distinctly involuntary and as having their origin within the woman rather than outside the woman. For we are told that the female sexual desires and changes in their sexual organs operate due to the very same causes (διὰ τὰ αὐτὰ ταῦτα) as those in men (91b9-c1). The womb (μήτρα) or uterus (ὑστέρα) within each woman is a separate, living (ζῷον) thing (91c1-2). That living thing inside each woman has its own desire for childbearing (ἐπιθυμητικὸν ἐνὸν τῆς παιδοποιίας) (91c2). Like the male sexual organ's need for venting of seed or marrow, the female sexual organs require use or else, the text says, extreme and debilitating frustration will set in. For when (ὅταν) a woman's womb or uterus remains unfruitful (ἄκαρπον) for an unseasonably long period of time (παρὰ τὴν ὥραν χρόνον πολὺν γίγνηται), her desire for childbearing, without fulfillment or outlet, travels everywhere up and down her body (πλανώμενον πάντη κατὰ τὸ σῶμα) (91c2-4). As a result of this spreading all over her body, her respiratory passages are blocked up so that she is unable to breathe properly. Without being able to breathe properly, and as long as her womb desires to be fruitful, remaining unfruitful, she is thrown into extreme emergencies; all other kinds of illnesses are produced in her (91c4-6). This continues until the woman's womb is made fruitful (91c6-7).

Note that, in this explanation of sexual desire and procreative drive in women, the primary origin is internal rather than external. The female sexual organs are part of a separate, ensouled living thing within the man. That separate, ensouled living thing within the woman is disobedient, unruly, self-ruling, and self-willed; it disrupts the woman's respiratory system and severely damages her general health in many other ways until finally it gets its way. Until the woman's womb is fruitful, we are told, her sexual organs throw her body into tumult. That separate, ensouled part of her must get its way or else the woman's

health will continuously suffer. Its movements, then, are involuntary in comparison with the movements of the woman's arms and legs: the woman is not in control of her womb's desire to be fruitful. There is no mention of a specific set of characteristics to which a woman might be attracted in a mate. Just as in the case of the description of the ensouled living thing within the male, the female sexual organs and reproductive desires as being deeply rooted and independent. They are also described as wanting satisfaction, but the satisfaction is not described in a way that cooperates with the person's senses, reason, imagination, and so on. The origin of the movements of female sexual desires, just as in the case of the origin of male sexual desires, is primarily internal rather than external. It is not triggered or prompted by the individual's coming to be aware of a particular candidate for an attractive mate but, rather, by the individual's internal, ensouled, living thing within it, its sexual organs and their surrounding parts, demanding of their own accord that they be satisfied.

Note, also, that Plato separates his accounts of self-motion from his accounts of involuntary motions. In Plato's *Phaedrus* 245c-246e, Socrates describes the soul as a self-moving thing and an imperishable, ungenerated source of motion for all other moved things. Socrates argues that since it is clear that things with souls have internal sources of motion, whereas things without souls are moved by something outside them, what it is to be a soul is at least in part to be something capable of self-motion.[93] In Plato's *Laws* 896a-897d, the Athenian Stranger reaffirms that the soul is a source of motion, connects life with the capacity for self-motion, and argues that self-motion must be the first kind of motion.[94]. On Plato's account, everything that moves ultimately owes its motion to a self-mover, and self-

[93] For more careful analyses of this passage see Bett 1986, 3 and Blyth 1997, 196f.

[94] For a detailed discussion of the relation between these two passages see Skemp 1942, 112. Kelsey 2004 argues that both passages do not push for the immortality of individual souls but, rather, for the immortality of "a kind of 'world soul' – some kind of universal source of all the world's motion".

movers necessarily do not owe their motion to anything else. Plato does not attach any qualifications to his account of self-motion. Yet, curiously, as we've seen, he ascribes a remarkably strong independence to the source of involuntary motions such as those of the sexual part in human beings. We may well wonder what Plato would say about whether and if so why it seems correct to say that people are able to move largely just because we want to move from one place to another, while conceding that we are often motivated to move by separate, ensouled, living things within us. It might be interesting to speculate about what Plato's account would have been concerning the apparent tension between ascriptions of self-movers to animals including human beings, on the one hand, and the concession that human and non-human animals (and, perhaps, especially non-human animals) are often moved by a separate living thing inside them over which we have little if any control. But I less interested in such speculation here than I am in the relevant implications of the plain fact that we do not find Plato drawing any connections or resolution of apparent tension between his accounts of self-motion and his accounts of involuntary motions (or the category of the involuntary in general, such as in his description of differing punishments for voluntary vs. involuntary vs. in-between actions at *Laws* 866e2-867c2, not long before a discussion of self-motion). In the next two sections, I'll try to draw out some of those relevant implications.

III. HOW ARISTOTLE DIVERGES FROM PLATO ON INVOLUNTARY MOTIONS

We've seen that, for Plato, the primary origin of involuntary motions is internal. We've also seen that Plato does not try to connect his account of self-motion with his account of involuntary motions. Instead, he has an account of self-motion on which the very first motion must have been a self-motion, and on which the soul is an unqualified self-

mover, requiring absolutely nothing else in any way in order to move itself. Aristotle diverges from Plato in both of these respects.

First, for Aristotle, the primary origin of involuntary motions need not be internal but, rather, it is often external. For those types of motions, he argues, occur when something appears (φανέντος τινός) but without the command of thought (οὐ μέντοι κελεύσαντος τοῦ νοῦ κινοῦντα) (*De motu animalium* 703b7-8). Aristotle states this idea in *Physics* viii 2 and 6 as well, as I'll discuss in the next section: the primary origin of many motions that are not voluntary (digestion, sexual arousal, breathing, growing, decaying) is not in the animal itself but, rather, in the animal's environment. Now, we should be cautious not to be too quick in characterizing this aspect of the distinction between Plato and Aristotle. The distinction is subtle in two ways: first, Aristotle allows the possibility that the origin of an involuntary motion is inside the animal, such as in animals that cannot see, smell or hear, but also in those animals that have the distance senses but are stimulated for some reason by an internal image without an external analog of the image; and, second, Aristotle retains much of Plato's language and conceptual scheme in this context by agreeing that the source of involuntary motions is like a separate, ensouled living thing within the animal.

Beginning with the first subtlety: though it is true that, typically for Aristotle, the thing that appears will be outside the animal, such as a mate or a food source or a predator, we should also note that Aristotle allows that even animals possessing only touch, taste, and basic forms of *phantasia* and desire, but which are mobile can move themselves (albeit in an indeterminate way) (*De anima* iii 11.433b31-434a5). On Aristotle's account, animals are impelled to move by desire. And the object moves desire: "the proximate reason for movement is desire, and this comes to be either through sense-perception or through *phantasia* or thought" (*De motu* 7.701a35-37). There is (a) *to orekton*, the object of desire, which

is the end or goal (*telos*) of the action, and there is (b) a spatially located physical body that is the spatial location towards which the motion is directed. When it comes to self-motion, Aristotle means (a), not necessarily (b). For all animals have memory, for Aristotle, all animals have at least some capacity for sensation, and *phantasia* is an *internal* image-forming capacity. Moreover, Plato observes that "the pounding of the heart…occurs when one expects what one fears or when one's spirit is aroused" and, though he does not describe external causes of that fear or arousal, we can probably assume he has those in mind (*Timaeus* 70c1-2). So, it is much too quick and careless to say that, for Plato, the primary origin of involuntary motions is always and in every sense internal whereas for Aristotle it is always and in every sense external; rather, for Plato the origin is largely internal (especially in the case of sexual involuntary motions) and, for Aristotle, the origin is typically external though, in some senses and in some more unusual cases, it is internal.

A second important nuance in this distinction between Plato and Aristotle's views on the origin of involuntary motions is that Aristotle retains much of Plato's language and conceptual scheme. We saw that, in the *Timaeus*, there are descriptions of one ensouled living thing in "us" (ἐν ἡμῖν), and another in women (ἐν ταῖς γυναιξὶν) (91a2-3). Plato describes the womb (μήτρα) or uterus (ὑστέρα) within each woman as a separate, living (ζῷον) thing (91c1-2). That living thing inside each woman has its own desire for childbearing (ἐπιθυμητικὸν ἐνὸν τῆς παιδοποιίας) (91c2). And we are told that not only are the sexual parts in men a separate, ensouled living thing, but, in addition, that separate thing is self-ruled or self-willed (αὐτοκρατὲς) and unruly or disobedient (ἀπειθές) (91b5-6). Similarly, Aristotle claims that each origin of involuntary motion, such as the heart and the generative part, is like a separate living creature (τὸ ὥσπερ ζῷον κεχωρισμένον ἑκάτερον εἶναι τῶν μορίων) (*De motu animalium* 11.703b21-22). This is why, for Aristotle, the movements of the

heart and the generative part are involuntary; such parts are moved when something appears but without the command of thought, as though a separate living creature moves those parts without any intentional motion from the animal (human or non-human) as a whole (703b5-6). Aristotle seems to be echoing Plato here, though it is worth noting two differences: first, Plato is more literal, in that the claim in the *Timaeus* is that within males and females there *is* a separate, ensouled living creature whereas Aristotle's claim is that the heart and the generative parts often function *like* (ὥσπερ) a separate existing, living creature; and, second, the *Timaeus* describes that separately existing creature as ensouled whereas Aristotle's weaker ὥσπερ ("like") claim in *De motu* mentions vital moisture but not soul.

The other main difference I wish to emphasize here between Plato and Aristotle's accounts of involuntary motions is that, whereas Plato does not try to connect his account of self-motion with his account of involuntary motions, Aristotle is quite deeply interested in the involuntary motions required for self-motion, in showing that this is one of the reasons that self-motion does not happen in an unqualified way. Some context will be helpful here. Aristotle begins *Physics* viii with some cosmologically inclined questions about motion:

Was there ever a becoming [γέγονέ] of motion [κίνησις] before which it had no being [οὐκ οὖσα], and is it perishing again [φθείρεται πάλιν] leaving nothing in motion [κινεῖσθαι μηδέν]? Or are we to say that it had neither a becoming [οὔτ' ἐγένετο] nor a perishing [οὔτε φθείρεται] but always was [ἀλλ' ἀεὶ ἦν] and always will be [ἀεὶ ἔσται]? Is it in fact an immortal [ἀθάνατον] and never-failing [ἄπαυστον] property of things that are, a sort of life as it were [οἷον ζωή τις οὖσα] to all naturally constituted things [τοῖς φύσει συνεστῶσι πᾶσιν]? (*Physics* 250b9-15)

Aristotle reports that all those who have anything to say about physics or nature (περὶ φύσεώς) affirm the existence (εἶναι) of motion (κίνησιν). For they focus on the creation of the world, and in particular on coming to be and ceasing to be (περὶ γενέσεως καὶ φθορᾶς).

But change is a prerequisite for coming to be and ceasing to be (ἀδύνατον ὑπάρχειν μὴ κινήσεως οὔσης) (viii 1.250b15-18).[95]

Opinions differ, though, on whether change is eternal. Anaxagoras, Aristotle tells us, holds that everything was together (ὁμοῦ) and at rest (ἠρεμούντων) for an infinite period of time. Empedocles, Aristotle goes on, holds that the universe is in motion only when (a) Love (ἡ φιλία) is making the one out of many (ἐκ πολλῶν ποιῇ τὸ ἓν) or (ἢ) (b) Strife (τὸ νεῖκος) is making many out of one (πολλὰ ἐξ ἑνός), but that the universe is at rest whenever neither (a) nor (b) is the case. Thus Anaxagoras and Empedocles answer "Yes" in response to the first question and "No" to the second and third. Aristotle argues emphatically for the opposite view: There necessarily always was and always will be motion in the world. Thus Aristotle concludes *Physics* viii 1: "Let this conclude what we have to say in support of our contention that there never was a time when there was not motion, and never will be a time when there will not be motion [ὅτι μὲν οὖν οὐδεὶς ἦν χρόνος οὐδ' ἔσται ὅτε κίνη σις οὐκ ἦν ἢ οὐκ ἔσται, εἰρήσθω τοσαῦτα]" (252b5-6). Throughout *Physics* viii he supports his view and examines some implications. The most famous and impressive of these is the universal necessity of the primary and unmoved mover (τὸ πρῶτον κινοῦν καὶ ἀκίνητον), otherwise known as God in Aristotle's *Metaphysics* Λ. Everything that is in motion is moved by something else, and ultimately by the primary unmoved mover.

Along the way, Aristotle considers some objections. He says that the most difficult of those objections, which I'll call the self-motion objection (SMO), goes as follows. Unlike lifeless (ἄψυχος) things, living (ἔμψυχος) things such as human and non-human animals seem to be able to start moving themselves by themselves without a cause of their motion

[95] The assumption that change exists is described elsewhere in Aristotle's *Physics* as axiomatic in any study of nature; see I.2.184b25-185a3, I.2.185a12-17, and VIII.3.253a32-b6.

outside (ἔξωθεν) them (viii 2.252b17-20). Animals walk, run, jump, swim, slither, soar, and climb without being pushed or pulled or more generally moved by anything else. At a time t_0 we are quite still, without any motion in us, and then at a later time t_1 we produce a beginning of motion in ourselves spontaneously (viii 2.252b17-21). Aristotle extrapolates: if motion can start in an animal by the animal alone, without external impetus, "then why could this not also occur in the universe [τί κωλύει τὸ αὐτὸ συμβῆναι καὶ κατὰ τὸ πᾶν]"? (viii 2.252b25-26). Perhaps the entire cosmos might be still at t_0, without any motion in it, and then at t_1 there is a spontaneous beginning of motion in the cosmos. But that period of time with no motion at t_0 would contradict Aristotle's thesis that there necessarily always was and always will be motion. So the SMO might be thought to present a difficulty (ἀπορία) for Aristotle's answers (viii 2.253a8).

One important way in which Aristotle responds to the SMO is by appealing to the fact of experience that many internal and external factors outside the animal's control, including involuntary motions, are often important in, and in some cases necessary for, an animal's ability to move itself. There are two main locations for this discussion: *Physics* viii 2 and VIII 6. In VIII 2, Aristotle argues that it is false that nothing sets a self-moving animal in motion because "there is always change in at least one of the animal's natural parts, and the cause of this change is not the animal itself, but possibly the animal's environment" (253a11-12). Aristotle explains, "the environment causes a lot of changes within the body, and some of these stir the animal's thoughts and desires, which then cause the whole animal to move" (253a16-18). Here he chooses sleep as an example: "although there is at the time no change occurring in the animal as a result of perception, nevertheless there is some change in it, and so it wakes up again" (253a19-20). Aristotle seems to mean that a sufficiently loud noise will wake up a sleeping (human or non-human) animal, whether or

not the animal desires to wake up, and despite the fact that the animal is not perceiving (at least not in the way it would when awake, perceiving an object of desire or one to be avoided). Though Aristotle generally classifies the motions in sleep as non-voluntary rather than involuntary, we can imagine that Aristotle would have similar things to say about the involuntary motions of an animal's heart or generative parts: the primary origin of these motions is not within the animal but, rather, in the animal's environment. So here we have a nice reflection of the fact that, for Aristotle, the primary origin of involuntary motions is normally outside the animal, that is, in the animal's environment, rather than inside the animal. We also see how Aristotle uses involuntary and non-voluntary motions involved in animal self-motion to show that the SMO is soluble.

After stating the SMO and his response to it in *Physics* viii 2, Aristotle promises that later on he will clarify his response. In *Physics* viii 6, he does so:

Even [an animal running or swimming or flying or in some other way moving itself from one place to another] is not strictly a self-change, because it is not due to the animals themselves, but to other changes which occur naturally in them and for which they are not responsible; I am thinking of changes like growth, wasting away, and breathing, which are going on in every animal even when it is at rest and not in the process of any self-initiated change. Responsibility for these other changes lies with the environment and often with the things which are ingested by the living thing. Food, for instance, is responsible for some changes; animals sleep while food is being digested, and then wake up and become self-changers while food is being distributed around their bodies, and so the original source of the change is external to them. That is why they are not always being changed continuously by themselves; the agent of change is something other than them, which is itself moving and changing in relation to each of these self-changers (259b5-16).

Motions such as inhaling and exhaling, digestion of food, growing, and wasting away are, Aristotle notes, not in the animal's control; they are not voluntary motions. Yet such motions are involved in important ways (and, in some cases, they are necessary conditions) in the process of an running or swimming or flying or in some other way moving itself from one place to another. In the case of motions such as digestion, the animal's environment, rather than the animal itself, is the primary origin. Judging from his other discussions of

involuntary motions in animals such as in *De motu animalium* 11 (discussed already here), Aristotle would presumably concede that, similarly, the motions of the sexual parts typically have their primary origin in something in the animal's environment, namely, what appears to be a good candidate for a mate or reproductive partner. Often, then, in such changes, the original source of the change is external to the animal. This is despite the fact that, as Plato would emphasize and Aristotle concedes, (human and non-human) animals have parts such as the heart and the penis that seem to function like a separated, ensouled living creature within the animal. The role of these involuntary motions in animal voluntary self-locomotion is crucial for Aristotle's response to the SMO. For it gives him an empirically verifiable and philosophically robust way of showing that change and motion do not spring up in things ex nihilo or out of nothing other than the very things (e.g. the animal) themselves. So, he has a nice answer to the objection we saw him raise in *Physics* viii 2. The objection, we recall, asks, if motion can start in an animal by the animal alone, without external impetus, "then why could this not also occur in the universe [τί κωλύει τὸ αὐτὸ συμβῆναι καὶ κατὰ τὸ πᾶν]"? (viii 2.252b25-26). But Aristotle takes himself to have shown that motion cannot start in an animal by the animal alone. This does not logically entail, of course, that this could not also occur in the universe. Rather, it renders innocuous what Aristotle calls the most pressing objection to his vital thesis that change and motion are necessarily eternal.

IV. SOME IMPLICATIONS OF THIS DIVERGENCE

Plato is adamant about the necessary fundamentality and priority of self-motion. He argues that all movements must "spring from some initial principle, which can hardly be anything except the change effected by self-generated motion" (*Laws* 895a1-3). For, he asks rhetorically, "how could anything whose motion is transmitted to it from something else be the first thing to effect an alteration?" (894e5-6). This is in large part why, in the *Timaeus*, we

find the claim, "the best of the motions is one that occurs within oneself and is caused by oneself. This is the motion that bears the greatest kinship to understanding and to the motion of the universe" (89a2-4). Of course, everyone who has worked on Aristotle's account of self-motion is well aware that Aristotle rejects most of the features of Plato's account of self-motion.[96] Aristotle argues that change and motion had no beginning but, rather, they simply always existed. As the eternal source of all motion, Aristotle argues for an unmoved mover, not a self-mover. He does this while firmly holding onto the claim that there are genuine self-movers, including all non-stationary (human and non-human) animals. On Aristotle's account, even souls, the paradigmatic self-movers on Plato's account (in the *Phaedrus* most explicitly), do not move themselves but, instead, an animal's soul causes the body to move. The soul moves the whole of the animal in search of some object of desire, an appearance courtesy of *phantasia*, targeted by the soul's faculty of desire (*De anima* iii 9-10). As such, the soul is moved accidentally or coincidentally. For Aristotle, the soul does not move itself. Nor does the soul move in its own right (καθ' αὑτό). I won't rehearse the other familiar distinctions here relevant to Plato and Aristotle's divergence on self-motion.

But it seems to me that my brief study of this specific divergence among Plato and Aristotle's accounts of involuntary motions can shed some new light on why, in the first place, Aristotle rejects most features of Plato's account of self-motion. To be sure, the divergence is much less impressively grand, sweeping, and abstract than Plato and Aristotle's respective views on the ultimate source of all motion in the universe. But it is, in a sense, helpfully simple and concrete that Plato just does not seem to be interested in the fact that the things that have paradigmatically self-moving souls, on his account, namely, creatures

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[96] See Berryman (2002), Corcilius and Gregoric (2013), Freeland (1994), Furley (1978), Gill (1991), Meyer (1994), Morison (2004), Olshewsky (1995), Wardy (1990: 93-99, 112-119), and Waterlow (1982: 204-261).

like us, cannot run or swim (that is, move ourselves) without relying in crucial ways on motions originating in our environment. Without the presence of a viable food source, we would still have the at least largely internally formed desire to eat. But we would not have any food source to which we move ourselves in order to eat. And, apart from moving toward what appears to us to be a viable source of nourishment, we also are not in control of how quickly it takes us to digest, how much energy we have as a result, or how much we are capable of moving ourselves around (as a result of post-feeding stupor) while digesting. We are in control of some aspects of our environment, including, in some cases, which particular environments we inhabit, but many aspects of our environment are outside our control. Similarly, without the presence of an attractive candidate for a mate or reproductive partner, we would still have the at least largely internally formed desire to mate and reproduce. But we would not have any mate to whom we move ourselves in order to mate.

Aristotle would find Plato not just confused about the claim that the very first motion must have been caused by a first mover but also, in particular, about the involuntary (and non-voluntary) motions involved in and in many cases required for self-motion. Plato argues, as we saw, that self-motion is the best kind of motion and the one most akin to understanding and the universe. In addition, Plato argues that "motion that is caused by the agency of something else is less good. Worst of all is the motion that moves, part by part, a passive body in a state of rest, and does so by means of other things" (*Timaeus* 89a5-7). So, for Plato, "self-motion is the most ancient and the most potent of all changes, whereas the change which is produced by something else and is in turn transmitted to other objects, comes second" (*Laws* X 895b6-8). For Aristotle, this ranking is deeply confused because self-motion is caused by the agency of something else. In fact, self-motion is caused by the agency of *many* things other than itself, including viable food sources, predators, attractive

mates, bad weather, and other such factors in an animal's environment. If we observed things (animals) moving themselves without the involvement or requirement of any involuntary or non-voluntary motions, and further analysis showed that motion really did spring up out of absolutely nothing except the animal itself, then Aristotle seems to think his fundamental thesis in *Physics* viii (not to mention *Metaphysics* Λ) would be endangered, namely, there cannot possibly be or have been any time without motion. For, as we saw in *Physics* viii 2, Aristotle worries that if, as Plato suggests, things can bring about a start of motion entirely within themselves and without any external impetus or cause whatsoever, then this might occur on a grander scale and, indeed, in the whole universe. So all motion might have begun, as Plato suggests in the *Laws* and the *Timaeus*, out of nothing at all other than the very thing causing the motion. And, for that matter, motion might cease and then begin again in the same manner. We would have no need of Aristotle's God, then, of *Metaphysics* Λ, the primary and unmoved mover who is the eternal source of all change. It is rather striking that empirical observations as seemingly mundane as those concerning the movements of digestion, sexual arousal, and sleep form an important part of the cause of Aristotle's breaking so deeply with Plato's account on matters as significant as the primary explanation of all motion and change.

V. CONCLUDING REMARKS

I've argued that among the divergences between Aristotle and Plato on some important involuntary motions, the two most significant are, first, that whereas for Plato the origin of involuntary motions is in the animal, for Aristotle the origin is in the animal's environment and, second, that Aristotle recognizes the role of involuntary motions in self-motion whereas Plato does not. I've also argued that these divergences help to explain why Aristotle has a highly qualified (but firmly upheld) notion of self-motion whereas Plato's is

unqualified, as well as why Aristotle posits an unmoved mover rather than a self-mover as the primary explanation for all motion and change.

It is, I think, of broader philosophical interest to reflect (as Aristotle invites us to do) on the connections between, on the one hand, actions we take ourselves to be autonomous in selecting and for which we normally take ourselves to be responsible and, on the other, many internal and external processes largely or even entirely outside our control. I consider it my own decision to sit here typing this sentence. I am doing it because I want to do it. It seems to me that I could just as easily have chosen to get up and have a snack or take a nap on a Sunday afternoon. Now it might seem that my digestion, my need for sleep, my need for food, and other such things that influence my capacity for action and motion take away from my autonomy and responsibility. This is the side of the connections to which Aristotle wishes to draw our attention: in the case of some of those processes, the cause is in the environment rather than in me, and even in some internally-based processes I am not really in control of their starting and stopping. So, Aristotle argues, it is not correct to say that I am continuously a self-mover or in every important sense a self-mover. But looking at those connections in a different way, one might say that it is precisely because a person is hungry and aware of her hunger, and because she is a little tired, and so on, that her decision to continue working is reasonably considered to spring from her own intentions, will, consciousness, and other factors taken to be vital to a person's agency. For instance, the fact that I am not much in control of my hunger, digestion, and other such things, the fact that my hunger is a strong desire whether I like it or not, and other such facts seem to make my decision more autonomous and seem to lend a deeper sense of responsibility to my decision. I suggest, then, that by reflecting on the connections between involuntary motions and self-motions, as Aristotle invites us to do, we can see more clearly not just many of the ways in

which self-motion is heavily qualified (as Aristotle emphasizes) but also some interesting ways in which it is precisely because we are not much in control of our hunger, need for sleep, and other such factors that many of our actions have a deepened sense of autonomy.

CONCLUSION: ARISTOTLE ON ANIMAL SELF-MOTION

Unlike non-living things such as manmade objects and the elements, human and non-human animals seem to be able to move from one place to another just because we want to move. Aristotle's biological works contain many descriptions of animals buzzing, flying, gliding, burrowing, climbing, walking, running, swimming, crawling, and slithering from one place to another. As a biologist (and, indeed, the first biologist), Aristotle is energetically interested in observing, studying, and systematically recording the structure and behavior of those animals. As a philosopher, Aristotle aims to make sense of the causes of motion, including self-motion, in a more general way. Does a bee move from one flower to another just because it wants to do so, or does the bee's motion depend on factors outside the bee's control? Does the bee's motion come from nothing other than the bee itself and the things under the bee's control, or is the bee's motion firmly set in the causal structure of the world? In my dissertation, I've given new reasons to think that Aristotle would answer those questions as follows. The bee moves because it wants to move, but the bee does not move *just* because it wants to move. That the bee moves because it wants to move is importantly compatible with the fact that the bee's motion depends on many factors outside the bee's control. And yes, the bee's motion does come from the bee itself and from things under the bee's control. But the bee's motion is also firmly set in the causal structure of the world. For many interesting and significant reasons, it's false that the bee's motion comes from nothing other than the bee itself and things under the bee's control.

A bee moves itself when it buzzes from one flower to another. Bees and other animals are thus capable of a uniquely autonomous, independent, and self-directed kind of change. Without the physical and non-physical means of motivating and allowing self-motion, flowers and other plants, as well as water in a nearby watering can and a neatly

constructd garden fence are all incapable of this special kind of change. Though water, dripping and moving downwards from a poorly placed watering can, appears to move by itself, water is incapable of moving itself. For, unlike the bee, the water does not have the physical and non-physical means of perceiving any objects around it, the means of forming an internal image of any of those objects or the means of desiring one of those objects as an object of pleasure. The same can be said of the flower, though the flower, like the bee and unlike the water, is alive. More specifically, when the bee moves from one flower to another, its faculty of desire is the primary mover in its soul, but desire always operates together with *phantasia* and practical *nous* in order for the bee to form an internal image of the next flower and in order for it to decide to pursue the next flower as an object of desire. Nature has designed bees so as to take advantage of the unique way in which air functions as an external resting point for the bee's wings and body, as the bee buzzes to and fro.

Though the bee's motion is self-directed, independent, and autonomous in important ways that the growth, reproduction, and metabolism of the flower is other-directed, dependent, and non-autonmous, and though the bee moves itself whereas the water can at best appear to move by itself, the bee's self-motion is deeply dependent on many factors outside the bee's control. Without air as an external resting point, the bee's wings would have no resistant force against which to press down, and so the bee would be unable to fly. The bee is not in control of internal processes such as digestion or respiration, and yet the bee's respiration and energy availability and consumption play impactful roles in whether the bee can move and how it moves. In addition, the bee is not in control of external obstacles to its motion, which affect how the bee is capable of moving. Nor does the bee control the proper functioning of its senses, including its distance senses such as its eyes and sense of sight, that are crucial for the bee to move itself in a determinate way.

Without those distance senses operating properly, the bee would simply drift in a seamlessly aimless way from one object to the next object, as a sea urchin moves in search of sustenance, using only its senses of touch and taste. The bee would only be capable of an indeterminate kind of self-motion, and would almost certainly be unable to continue living for long. Nor is the bee in control of environmental factors such as whether the flowers are healthy and whether there is too much (or not enough) rain. A more general way of capturing many of these dependency relations: the motion of the whole bee, its entire soul-and-body constitution, depends on the motion of its (proper) parts such as its digestive organs, its sensory organs, its trachea and other parts necessary for its respiration, the operation of its faculty of desire, and so on. If it were not for the complimenting motions of these (proper) parts, both physical and non-physical, within the whole of the bee, then the bee would be unable to move.

Similarly, you are not in control of whether the surface supporting the chair or couch on which you are currently sitting gives way. Nor are you (much or, in some cases, even partially) in control of the proper functioning of your eyes, central nervous system, respiration, digestion, brain, desire, people capable of knocking on your front door both in the last ten seconds and in the next ten seconds, your need for water and food, and many other internal and external factors that affect whether or not you can continue reading this conclusion, as well as how you will continue reading this conclusion. You were not in control of whether or not you were born. Nor were you in control of who your parents were, what time and society and social class you were born into, what sorts of genetics you have (in turn dramatically affecting your tendencies, proclivities, abilities, and so on), what sort of early upbringing you received, and many other factors that significantly impact whether or not you arrived at the current room and career in which you perform actions

such as reading this conclusion. But you probably take it as obvious that it is up to you whether or not you read this conclusion, and perhaps also obvious that you are responsible, as an autonomous agent, for reading this conclusion. Your action is firmly set in the causal structure of the world, caused in many active and passive ways by many factors and absences of factors partially or entirely outside your control. Yet it seems right to say that you read this conclusion because you want to read this conclusion, and later on you will get some fresh air because you want to get some fresh air. It also seems right to say these things, in my view, even after reflection on many of these dependency-relations. So, as I see it, the new areas of compatibilism in Aristotle's account of animal self-motion that I've excavated in my dissertation can shed light on underexplored – and in some cases just unexplored – yet strikingly concrete and uncontroversial senses in which we hold that autonomy and responsibility are compatible with our actions being, to a large extent, outside our control. Or, to put the matter more tendentiously: we seem to accept that the fact that our actions are (at least largely) determined is compatible with our actions being free and up to us, such that we are (morally) responsible for what we do. By studying Aristotle's account in the ways I've done here, then, I suggest that we can bring out new senses in which autonomy and (moral) responsibility are compatible with our actions being largely outside our control, compatible with something not far from what philosophers call 'determinism'.

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