

# Capacities and the Eternal in *Metaphysics* $\Theta$ .8 and *De Caelo*

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## Abstract

The dominant interpretation of *Metaphysics*  $\Theta$ .8 commits Aristotle to the claim that the heavenly bodies' eternal movements are not the exercises of capacities. Against this, I argue that these movements are the result of necessarily exercised capacities. I clarify what it is for a heavenly body to possess a nature and argue that a body's nature cannot be a final cause unless the natural body possesses capacities that are exercised for the sake of its nature *qua* form. This discussion yields a better understanding of what capacities are, what explanatory work capacities do, and what it is to possess a nature.

## Keywords

Aristotle – *Metaphysics* – *De Caelo* – capacity – activity – eternal – nature – aither

## 1 Introduction

There is a tension in Aristotle's views about capacities and activities.<sup>1</sup> It arises when we leave behind the relatively familiar domain of perishable, terrestrial bodies. As should be expected, imperishable beings and their eternal activities give rise to special problems. This tension strikes at the very heart of what capacities are and the explanatory work that capacities are supposed to

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perform. Given the centrality of capacities to Aristotle's physics, biology, metaphysics and ethics, a resolution is imperative.

On the one hand, Aristotle spends a considerable amount of time defending the claim that nothing eternal is *dunamei*, i.e. that nothing eternal is potentially, or is in capacity (*Metaph.* Θ.8, 1050b6-28). That nothing eternal is *dunamei* is a central premise of one of Aristotle's arguments that *energeia* (actuality/activity) is prior in substance (οὐσία) to *dunamis* (potentiality/capacity).<sup>2</sup> This priority thesis is the capstone of *Metaphysics* Θ and is among the most important conclusions that Aristotle establishes in his exploration of the absolute principles of first philosophy. According to the presently dominant interpretation of the claim that nothing eternal is *dunamei*, which I will call *the pure actuality account*, Aristotle maintains that if something is a certain way eternally, then its being this way is not the result of the exercise of an underlying capacity.<sup>3</sup> That is, according to the pure actuality account, there are actualities, for example the movements and being of the heavenly bodies, that do not have corresponding potentialities.

On the other hand, Aristotle believes that heavenly bodies possess a nature (φύσις) and that this nature is the principle (ἀρχή) of their eternal circular movement.<sup>4</sup> This is the foundation of Aristotle's account in *De Caelo* and, I will argue, is consistent with the unmoved mover's role as an external efficient cause of the heaven's movement. But there seems to be a close connection between natures and capacities. First, is it plausible to think of a *dunamis* as a principle of movement that is internal (ἐντός) to that which possesses it. For a body possesses its natural capacities *per se* (*Phys.* 2.1, 192b35-6), and Aristotle refers to these capacities as the principles (ἀρχαί) of the changes

2 Although I often leave them transliterated, I will, when English is more appropriate, translate (i) δύναμις and ἐνέργεια (nominative case) as both 'potentiality' and 'capacity', and both 'actuality' and 'activity', respectively, and (ii) δυνάμει and ἐνεργείᾳ (dative case, with adverbial force, modifying the verbal noun τὸ εἶν) as both 'in potentiality' and 'in capacity', and both 'in actuality' and 'in activity', respectively. Although these concepts will become clearer as we proceed, I should note from the beginning that a major crux of the disagreements that follow concerns the relationship between the possession of a *dunamis* to (be) φ and being a φ (or φ-ing) *dunamei*. The interpretations I oppose maintain that if something possesses a *dunamis* to (be) φ, then it is possible for that thing to (be) φ *dunamei*. I will argue that there is at least one *dunamis* to φ, viz. the capacity, that only heavenly bodies possess, to move circularly, that does not entail that the objects that possess it can φ (or be φ-ers) *dunamei*.

3 I will focus on the interpretations of Makin 2006 and Beere 2009.

4 Aristotle calls these movements natural at *Cael.* 1.2, 268b15-16, 269a5-7, 269b1-6; 2.2, 285a30; 2.3, 286a16-17; 2.7, 289a15-16; 2.12, 293a9-10—and at numerous places outside *De Caelo*.

and movements natural bodies effect and suffer (*Metaph.* Θ.1, 1046a9-11).<sup>5</sup> And secondly, Aristotle often compares nature to art (τέχνη) and, if one has mastered an art, one's artistic movements arise from a single, stable condition or state (ἕξις) that comprises numerous capacities for movement. Indeed, at one point, Aristotle states explicitly that there is a sense in which 'nature is in the same class as capacity'.<sup>6</sup> Although I will argue that it is a mistake to say that a nature is primarily a kind of *dunamis*—we should identify a thing's nature primarily with its form—it is nevertheless the case that a complete understanding of what it is to possess a nature includes an ineliminable appeal to capacities. If correct, Aristotle must think that the heavenly bodies' eternal movements are the exercises of capacities for such movements and that this is somehow related to their status as natural.

Everyone agrees that the heaven's circular motion is eternal and is eternal necessarily. The disagreement concerns whether this movement's eternality is consistent with its being the exercise of an underlying capacity. There is no simple reconciliation of this tension. There are two paths available and each incurs a cost. First, one can defend the claim that eternal activity and eternal being are pure in the sense that these activities and this manner of being are not in any way the exercises of corresponding capacities. The cost: either give up the view that heavenly bodies are natural (φυσική) or reconceive what it is to possess a nature or to be by nature (κατὰ φύσιν) in such a way that an appeal to capacities and their exercises is not required. Secondly, one can defend the view that heavenly bodies are natural bodies and that this status involves an ineliminable appeal to capacities and their exercises. The cost: one must provide an alternative reading of Aristotle's argument in Θ.8 that nothing eternal is *dunamei* and must reform the understanding of capacities that has made the pure actuality account seem so plausible.

In this essay, I follow the second path. I first present an alternative reading of Aristotle's claim that nothing eternal is *dunamei*, which I will call *the capacity account* (Section 2). According to the capacity account, Aristotle does not conclude that it is necessary that eternal things have *no* capacities; Aristotle's conclusion is that it is necessary that eternal things have no *unexercised* capacities. Although I think this interpretation is ultimately correct, it is, on its own, unsatisfying. This is because it does not free us from the conception of capacities and their exercises that makes so many prefer the pure actuality account. I present Aristotle's argument in full, and discuss in detail what I take

5 See also *Phys.* 2.1, 192b18-19 where Aristotle calls nature a native impulse (δρμη ἔμφυτος).

6 καὶ γὰρ ἡ φύσις ἐν ταύτῳ [γίνεται· ἐν ταύτῳ γὰρ] γένει τῆ αὐτο (1049b8-9). Translations of passages from *Metaphysics* Θ are my own. Other translations, with minor changes, are taken from Leggatt 1995 and Barnes 1984.

to be the best arguments for the pure actuality account in Section 3. I then explore Aristotle's views about the heavenly bodies' movements, and defend an account that (i) considers the heavenly bodies' status as natural to be central, (ii) takes the heavenly bodies' movements to be the exercises of capacities, and (iii) is not only consistent with, but helps to make better sense of, *Metaphysics* Θ.8 (Section 4). I then return to the challenges that the arguments for the pure actuality account raise for the capacity account and try to overcome them (Section 5). With this détente in hand, I proceed to make a more general case for the view that if something possesses a nature, it must possess capacities (Section 6). I argue that a natural body's nature cannot be a final cause unless the natural body possesses capacities that are, and are exercised, for the sake of the (further) realization or perpetuation of its nature *qua* form. I aim not only to undermine the pure actuality account but, in so doing, to provide a better understanding of what capacities are, what explanatory work capacities do, and what it is to possess a nature.

## 2 Nothing Eternal is *dunamei*

In *Metaphysics* Θ.8, Aristotle defends the claim that *energeia* is prior to *dunamis*. He dedicates the chapter's first half to the three respects in which this claim is true for perishable things: in account, in time and in substance. I wish to focus on the chapter's second half where Aristotle turns his attention to eternal things. For, when it comes to the eternal, the priority in substance of *energeia* over *dunamis* holds in a stricter sense (κυριωτέρως, 1050b6).

Aristotle's main argument is quite simple and relies on only two premises:

[P1] Eternal things are prior in substance to perishable things (1050b6-7).

[P2] Nothing eternal is *dunamei* (1050b7-8).

Given that 'the attributes of prior things are called prior' (Δ.11, 1018b37-1019a1), and given that Aristotle takes [P2] to be equivalent to the claim that everything eternal is *energeiāi* (Θ.8, 1050b18), it follows that the only manner of being that eternal things possess, being *energeiāi*, is prior in substance to the manner of being that perishable things may possess, being *dunamei*.

Aristotle does not defend [P1] in Θ.8 and I will follow suit and simply grant it.<sup>7</sup> Aristotle spends most of his time defending [P2], the claim that nothing

7 Aristotle takes it to be uncontroversial that 'if these [sc. eternal things] were not, nothing would be' (1050b19). If he also thinks that eternal things could be without perishable things also being, this would, by Plato's Criterion (which we will soon discuss), serve as an argument

eternal is *dunamei*, and it is this claim that will occupy us in the remainder of this essay.

Before we discuss Aristotle's argument for [P<sub>2</sub>] in detail, it is important to see how many interpreters construe its conclusion. Jonathan Beere, for example, takes [P<sub>2</sub>]'s significance to consist in this (Beere 2009, 314):

[I]f something is eternally a certain way, then its being that way is not the exercise of any capacity. For instance, if something is eternally a heavenly sphere, then its being a heavenly sphere is not the exercise of any capacity of anything (for instance, a capacity of some underlying matter) to be a sphere. And if something is eternally rotating, then its rotating is not the exercise of a capacity to rotate.

Stephen Makin defends a similar interpretation (Makin 2006, 209-10):<sup>8</sup>

[S]omething which is eternally F should not be thought of as eternally manifesting a potentiality to be F . . . An eternal change is *not* the exercise of an underlying capacity (potentiality). A substance which is eternally (F) is *not* an actuality relative to any potentiality (to be F).

But this is not the only reading available. I will defend a more modest interpretation. Aristotle does not conclude, as Beere, Makin and other proponents of the pure actuality account would have it, that it is necessary that eternal things have *no* capacities. Aristotle argues for the capacity account: it is necessary that eternal things have *no unexercised* capacities.<sup>9</sup>

Both interpretations satisfy Aristotle's motives for establishing the claim that nothing eternal is *dunamei*. Aristotle needs to overcome an apparent obstacle to his ultimate priority thesis, viz. that *energeia* is prior in substance to *dunamis*. When it comes to eternal things, Aristotle endorses what has come

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for [P<sub>1</sub>]. How Aristotle would defend these claims and whether in doing so he would need to avail himself of the resources of, say, *Physics* 8, is an interesting question, but we will not investigate it here.

8 In a similar spirit, 2006, 212: '[T]he moral of [P<sub>2</sub>] is that there is a fundamental metaphysical difference between what is temporarily or intermittently (F) and what is eternally (F). The former does, while the latter does not, involve the actualization of an underlying potentiality to be (F).'

9 I later discovered a similar suggestion in Menn *forthcoming*, although Menn does not engage the arguments for the pure actuality account and does not there develop an alternative account of capacities and their exercises that is needed if the capacity account is to be plausible.

to be known as Plato's Criterion or Plato's Test. According to Plato's Criterion,  $x$  is prior in substance to  $y$  if and only if (i) if  $x$  were not,  $y$  would not be and (ii) it is not the case that if  $y$  were not,  $x$  would not be.<sup>10</sup> But when Plato's Criterion is applied to *dunamis* and *energeiai*, it initially seems to support the converse of Aristotle's priority thesis. For in general the existence of a *dunamis* does not imply the existence of a corresponding *energeia*. Aristotle argues in Θ.3 that something can possess a capacity without exercising it. For example, a house-builder can possess all the capacities that come with mastering the art of house-building even when sitting on the couch or sleeping. But if (i) *all dunamis* can exist unexercised, then Aristotle cannot also maintain (ii) that the existence of an *energeia* entails the existence of a corresponding *dunamis*. At least, he cannot if he wants to maintain the priority in substance of *energeia* over *dunamis*. For the existential asymmetry these two claims capture would, by Plato's Criterion, make *dunamis* prior in substance to *energeia*. Aristotle voices this concern on several occasions. For example, Aristotle notes that 'it is thought that everything that acts is capable [of acting], but that not everything that is capable [of acting] acts, so that *dunamis* is prior' (Λ.6, 1071b23-4; cf. B.6, 1003a1-2).

We can see, then, why many would want to attribute to Aristotle the view that eternally exercised *energeiai* do not entail a corresponding *dunamis*. For it is among eternal things that we find the absolute principles of both physics and first philosophy. It is in this domain, most of all, where *energeia* should be prior in substance to *dunamis*. It is in this domain, most of all, where there should be no possibility of an unexercised capacity. And if all capacities can exist unexercised, the only way to achieve this result is to eliminate the relevant capacities altogether.

But denying capacities to eternal things is not the only way for Aristotle to overcome this obstacle to his priority thesis. Aristotle could maintain that all *energeiai* entail the existence of a corresponding *dunamis* and avoid any negative consequences so long as he also denies that these *dunamis* can exist

10 For those things are said to be prior in substance 'which can be without other things, while the others cannot be without them' (Δ.11, 1019a3-4). There is controversy regarding the extent to which Aristotle employs Plato's Criterion as the sole or primary criterion whereby one establishes priority in substance. For example, few believe he employs it to establish the priority in substance of *energeia* over *dunamis* when his focus is perishable things. But I follow the majority of interpreters when I take Aristotle's discussion of eternal things in Θ.8 to be a relatively straightforward example of a case where Plato's Criterion is operative in at least the sense that its truth, in this domain, raises serious obstacles that Aristotle must overcome (in addition to its occurrence at 1050b19 in support of [P1]).

unexercised. That is, Aristotle can say that there are some *energeiai*, namely *energeiai* that occur eternally, that are exercises of corresponding *dunameis*, but that such *dunameis* cannot be without their *energeiai* also being. The mutual entailment of *dunamis* and *energeia* in these cases would not preclude *energeia* from being prior in substance to *dunamis* since these *energeiai* would still be considered the cause of being for the corresponding *dunameis* (*Cat.* 12, 14b12). So in order to secure the highest or strictest priority in substance of *energeia* over *dunamis* among eternal things, Aristotle only needs this minimal claim: that if something is eternally a certain way, then its being this way is due to the exercise of a necessarily or essentially exercised *dunamis*. For example, the heavens' capacity for circular motion is exercised eternally and necessarily. I contend that this is precisely what Aristotle argues for in  $\Theta$ .8.

In order to defend this interpretation, we will have to look closely at Aristotle's argument in  $\Theta$ .8. The dominant interpretation, the pure actuality account, has its status for a reason. Although Aristotle need not defend the pure actuality account's stronger conclusion in order to secure the priority in substance of *energeia* over *dunamis*, there are many considerations that suggest that he nevertheless does so, and these considerations must be met for the capacity account to be plausible. So I will now turn to a more thorough analysis of Aristotle's argument to bring the reasons why many prefer the pure actuality account into relief.

### 3 Aristotle's Argument and the Pure Actuality Account

Although long, I want to present Aristotle's  $\Theta$ .8 discussion in full. It comprises the brief argument for the priority of *energeia* over *dunamis* (A<sub>0</sub>), an argument for the claim, equivalent to [P2], that all eternal things are *energeiai* (A<sub>1</sub>)-(A<sub>8</sub>), three corollaries of the claim that all eternal things are *energeiai* (A<sub>9</sub>)-(A<sub>11</sub>), and an application of these conclusions to the case of the heavenly bodies (A<sub>12</sub>):<sup>11</sup>

11 [1050b6] (A<sub>0</sub>) ἀλλὰ μὴν καὶ κυριωτέρως· τὰ μὲν γὰρ αἴδια πρότερα τῇ οὐσίᾳ τῶν φθαρτῶν, ἔστι δ' οὐθὲν δυνάμει αἴδιον. λόγος δὲ ὅδε· (A<sub>1</sub>) πᾶσα δύναμις ἅμα τῆς ἀντιφάσεώς ἐστιν· τὸ μὲν γὰρ μὴ δυνατὸν ὑπάρχειν οὐκ [b10] ἂν ὑπάρξειεν οὐθενί, τὸ δυνατὸν δὲ πᾶν ἐνδέχεται μὴ ἐνεργεῖν. (A<sub>2</sub>) τὸ ἄρα δυνατὸν εἶναι ἐνδέχεται καὶ εἶναι καὶ μὴ εἶναι· (A<sub>3</sub>) τὸ αὐτὸ ἄρα δυνατὸν καὶ εἶναι καὶ μὴ εἶναι. (A<sub>4</sub>) τὸ δὲ δυνατὸν μὴ εἶναι ἐνδέχεται μὴ εἶναι· (A<sub>5</sub>) τὸ δὲ ἐνδεχόμενον μὴ εἶναι φθαρτόν, ἢ ἀπλῶς ἢ τοῦτο αὐτὸ ὃ λέγεται [b15] ἐνδέχασθαι μὴ εἶναι, ἢ κατὰ τόπον ἢ κατὰ τὸ ποσὸν ἢ ποιόν· ἀπλῶς δὲ τὸ κατ' οὐσίαν. (A<sub>6</sub>) οὐθὲν ἄρα τῶν ἀφθάρτων ἀπλῶς δυνάμει ἔστιν ἀπλῶς (A<sub>7</sub>) (κατὰ τι δὲ οὐδὲν κωλύει, ὅσον ποιόν ἢ πού)· (A<sub>8</sub>) ἐνεργεῖα ἄρα πάντα·

(A0) But, in addition, [*energeia* is prior in substance to *dunamis*] in a stricter sense. For [P1] eternal things are prior in substance to perishable things, and [P2] nothing is eternal *dunamei*. The reason is this. (A1) Every capacity is simultaneously for the contradictory; for, whereas that which is not capable of obtaining cannot obtain in anything, everything that is capable may fail to act. (A2) Therefore, that which is capable of being may either be or not be. (A3) Therefore, the same thing is able both to be and not to be. (A4) And that which is capable of not being may fail to be. (A5) And that which may fail to be is perishable, either without qualification, or in the precise sense in which it is said that it may fail to be, i.e. either in respect of place or quantity or quality—where [perishable] without qualification is [perishable] in substance. (A6) Therefore, nothing which is without qualification imperishable is *dunamei* without qualification. (A7) (Though nothing prevents this in some respect, e.g. in quality or in location.) (A8) Therefore, all such things are *energeiai*. (1050b6-18)

(A9) Nor is anything which is of necessity [*dunamei*]. Indeed, these things are primary; for if these were not, nothing would be. (A10) Nor is eternal movement, if there be such, [*dunamei*]. (A11) Nor, if there is an eternally-moved, is it moved in accordance with capacity except for from-where and to-where (for nothing prevents there being a matter for this). (1050b18-22)

(A12) Therefore the sun and stars and the whole heaven are always active and there is no fear that they may sometime stop, as those who study nature fear. Nor do they tire in doing this; for movement does not concern for them, as it does for perishable things, a capacity for the contradictory, so that the continuity of movement is laborious. For the cause of this is substance which is matter and capacity, not *energeia*. (1050b22-8)

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(A9) οὐδὲ τῶν ἐξ ἀνάγκης ὄντων (καίτοι ταῦτα πρῶτα· εἰ γὰρ ταῦτα μὴ ἦν, οὐθὲν ἂν ἦν)· [b20]  
 (A10) οὐδὲ δὴ κίνησις, εἴ τίς ἐστὶν αἰδίου· (A11) οὐδ' εἴ τι κινούμενον αἰδίον, οὐκ ἔστι κατὰ δύναμιν κινούμενον ἀλλ' ἢ ποθὲν ποί (τούτου δ' ὕλην οὐδὲν κωλύει ὑπάρχειν), (A12) διὸ αἰεὶ ἐνεργεῖ ἥλιος καὶ ἄστρα καὶ ὅλος ὁ οὐρανός, καὶ οὐ φοβερόν μὴ ποτε στῆ, ὃ φοβοῦνται οἱ περὶ φύσεως. οὐδὲ κάμνει τοῦτο δρῶντα· οὐ [b25] γὰρ περὶ τὴν δύναμιν τῆς ἀντιφάσεως αὐτοῖς, οἷον τοῖς φθαρτοῖς, ἢ κίνησις, ὥστε ἐπίπονον εἶναι τὴν συνέχειαν τῆς κινήσεως· ἢ γὰρ οὐσία ὕλη καὶ δύναμις οὐσα, οὐκ ἐνέργεια, αἰτία τούτου.

I will present the recent and representative interpretations of this discussion by Makin and Beere in turn and then summarize the core commitments each holds concerning the relationship between capacities and the eternal.

### 3.1 *Makin's Interpretation*

According to Makin, Aristotle's argument for the claim that nothing eternal is *dunamei* employs two major premises. The first is that the eternal is imperishable:

[M<sub>1</sub>] If something is eternally (F), then it is imperishable (in respect of F).<sup>12</sup>

At 1050b16, Aristotle replaces 'eternal' with 'imperishable', and this transition is licensed because Aristotle is committed to the derivability of imperishability from eternity (given other various assumptions). Aristotle does not argue for this in  $\Theta$ .8, but does assert that eternity implies imperishability in several places.<sup>13</sup> The arguments for this claim are notoriously difficult and would require an extended treatment to make them pellucid. For present purposes, we will simply assume that [M<sub>1</sub>] is correct and exclude from consideration the view that something perishable could exist forever.<sup>14</sup>

The argument's second major premise concerns the connection between being something *dunamei* and perishability:

[M<sub>2</sub>] If something is potentially (F), then it is perishable (in respect of F).

If [M<sub>1</sub>] and [M<sub>2</sub>] are both true, then if something is eternally (F) it is not potentially (F), and if something is potentially (F) it is not eternally (F).

Aristotle spends most of his time, (A<sub>1</sub>)-(A<sub>8</sub>), arguing for [M<sub>2</sub>]. The case for [M<sub>2</sub>] begins with the claim that 'every capacity [ $\delta\acute{\upsilon}\nu\alpha\mu\iota\varsigma$ ] is simultaneously for the contradictory' (1050b8-9). In  $\Theta$ .2, Aristotle introduces a distinction between rational ( $\mu\epsilon\tau\grave{\alpha}$   $\lambda\acute{o}\gamma\omicron\upsilon$ ) and non-rational ( $\acute{\alpha}\lambda\omicron\gamma\omicron\iota$ ) capacities. Rational capacities, e.g. crafts, are two-way capacities. That is, a single rational capac-

12 Both [M<sub>1</sub>] and [M<sub>2</sub>] occur at Makin 2006, 210-11. Makin uses the labels [2A] and [2B].

13 For example, at *GC* 2.9, 335a33-4; 2.11, 338a1-3; *Metaph.* H.2, 1026b27-30; N.2, 1088b23-5; and throughout *Cael.* 1.12.

14 A limited attempt to understand one of Aristotle's arguments for this claim occurs in n. 35 below. Plato famously thinks that the gods were generated and are in principle perishable but are nevertheless eternal since the creator chooses to guarantee their continuous existence (*Timaeus* 41a-b) and Aristotle targets this position explicitly (*Cael.* 1.10, 280a27-32).

ity can be a capacity for contrary outcomes—a doctor, for example, can use her medical expertise to heal and to harm. In contrast, a non-rational capacity is a one-way capacity. A non-rational capacity, when exercised in appropriate circumstances, only gives rise to a single outcome and never to its contrary. When Aristotle asserts that every capacity is for the contradictory he is not saying that all capacities are two-way capacities. He is simply saying that the capacities under investigation, be they rational or non-rational, are such that they might not be exercised.<sup>15</sup> The possibility of unexercised capacities is among the principal claims Aristotle establishes in his arguments against the Megarians in Θ.3, and Aristotle reaffirms this claim in several other places.<sup>16</sup>

The upshot of this consideration is, according to Makin (2006, 211), the most important premise, (A<sub>1</sub>), in Aristotle's argument for [M<sub>2</sub>]:

[FAIL] Anything potential can fail to be actual.

Given [FAIL], the argument for [M<sub>2</sub>] is fairly straightforward (2006, 212):

1. If A is potentially (F) [i.e. is (F) *dunamei*], then A can fail to be actually (F). [FAIL] (A<sub>1</sub>)
2. So A can be (F) and A can fail to be (F). (A<sub>2</sub>)
3. Since A can fail to be (F), A is perishable (in respect of F). (A<sub>5</sub>)
4. So if A is potentially (F), then A is perishable (in respect of F). [M<sub>2</sub>] (A<sub>6</sub>/A<sub>8</sub>)

If this argument is sound, it follows, given [M<sub>1</sub>], that if something is eternally (F), then it is not potentially (F).

Makin reads this argument as committing Aristotle to the view that, if something is eternally (F), it is not so in virtue of the actualization or exercise of an underlying potentiality or capacity to be (F). So, for example, the heavenly bodies' eternal circular movements are not the exercises of capacities for circular movement.

Makin supports this reading by offering a challenge to the interpreter who would deny [M<sub>2</sub>]. Such an interpreter must attribute capacities that cannot

15 The claim is that, for anything that is  $\varphi$ -ing in virtue of a capacity to  $\varphi$ , that  $\varphi$ -ing might cease. It does not follow that there is something that may on one occasion  $\varphi$  and may, while still existing as the self-same thing, not  $\varphi$  on another occasion. For there are many things, e.g. living organisms, for which there is a  $\varphi$  such that to  $\varphi$  (in this case, to live) is to be. In such cases, a cessation of  $\varphi$ -ing would constitute the ceasing to be of the thing that  $\varphi$ -s.

16 For example, at *Int.* 12, 21b12-17; *Metaph.* B.6, 1003a1-2; Λ.6, 1071b13-26; N.2, 1088b19-20.

fail to be actualized to eternal things. Attributions of this sort are unmotivated, he argues, because they are explanatorily otiose. First, they can play no role in explaining why an eternally exercised capacity is exercised eternally. Secondly, they cannot serve the explanatory role that Makin claims capacities are introduced to serve. According to Makin, 'potentialities (capacities) are useful precisely because they can persist even when unactualized (unexercised). Potentialities which cannot fail to be actual are redundant, and to insist on them is really to insist on a form of words' (Makin 2006, 214). Megarian concerns about intermittently exercised capacities simply do not arise for those things which are the way they are eternally, so there is nothing, it seems, for capacities to explain in these cases.

### 3.2 *Beere's Interpretation*

Beere's interpretation follows Makin's in its broad strokes, but the supplementary elucidations he provides elevate the obstacles that anyone who wishes to challenge their shared conclusions must overcome. Beere thinks Aristotle's argument proceeds as follows:<sup>17</sup>

1. If something is in capacity F [i.e. is F *dunamei*], it has a capacity to be F. (from  $\Theta.7$ )
2. If something has a capacity to be F, then it is possible that it not be F. (A1-A3)
3. So, if something is in capacity F, then it is possible that it not be F. (1, 2)
4. So, if something is in capacity eternal, then it is possible that it not be eternal. (by substitution on 3)
5. If it is possible that something is not eternal, then it is possible that there is a time at which that thing does not exist. (by the definition of 'eternal')
6. If it is possible that there is a time at which something does not exist, then that thing is perishable. (by the definition of 'perishable') (A5)
7. So, if something were in capacity eternal, then some eternal thing would be perishable. (4, 5, 6) (A6/A8)

This conclusion can be extended to cases in which F picks out something in a category other than substance. So Beere interprets (A10) to mean that if something is eternally moving, 'its moving, rather than not moving, is not the

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17 This argument is reconstructed from Beere 2009, 316-18. Beere gives the premises different numbers and introduces them in a slightly different order. But this presentation, I take it, captures accurately what Beere thinks is the valid form of reasoning found in  $\Theta.8$ .

exercise of a capacity to move rather than to rest' (Beere 2009, 318-19). In general, 'Aristotle thinks that whatever is eternally F, for any predicate F, is F in *energeia*, and that neither it nor some underlying matter is in capacity F' (2009, 319).

This conclusion sits well with Beere's broader conception of capacities. To be something *dunamei*—to have, in Beere's terminology, being-in-capacity (εἶναι δυνάμει)—is to possess one or more underlying capacities. Often these capacities are capacities for movement (δυνάμεις κατὰ κίνησιν), but this is not necessary. What is necessary, according to Beere, is that these capacities be intrinsic properties of a thing (or its underlying matter) that are distinct from, and help to explain, the activities that are these capacities' exercises. He writes (2009, 321-2):

If there were, *per impossibile*, a capacity that were necessarily exercised, then it would be identical with its own *energeia*. That is, there would not in fact be a capacity in the only meaningful sense that Aristotle recognizes capacities: properties distinct from the *energeiai* that are their exercise. This derives from the very point of the concept of a capacity, which the Megarics failed to grasp. Capacities are the intrinsic properties of things that constitute their 'complete readiness' to be agents or patients in changes that sometimes do and sometimes do not occur. Capacities, together with certain associated circumstances, are invoked to explain why certain changes occur on the occasions they do.

So Makin and Beere agree that the primary role of capacities is to capture what it is about a thing that explains why it changes on those occasions when circumstances are appropriate, and that, in opposition to the Megarians, these capacities must be distinct from their corresponding activities and remain present when not being exercised. Since eternal movements never cease, capacities for eternal movement can serve neither explanatory role.

#### 4 Heavenly Bodies as Natural Bodies

Both Makin and Beere apply their interpretations to the case of heavenly bodies. Makin states that 'the sun's motion is a detached actuality' (Makin 2006, 216). Beere uses a similar expression when he says that an eternal thing being what it is is 'a self-standing *energeia*' (Beere 2009, 316) and states that 'the sun's being what it is and doing what it does is not the exercise of something's capacity to be a sun or to do what the sun does' (315).

This application is to be expected, since Aristotle clearly has the heavenly bodies in mind in  $\Theta.8$ . Aristotle draws out his view's consequences for such bodies explicitly in (A12). He notes that these bodies are always active, that they will not tire, and that the continuity of their movement is not laborious. Aristotle makes similar claims in *De Caelo*: the heavenly bodies' motions are free from toil and are not laborious (2.1, 284a14-18, 27-35). In *De Caelo*, Aristotle says that this is due to the fact that their motions are both natural and free from external constraint. But this explanation, according to the pure actuality account, cannot be Aristotle's considered view in  $\Theta.8$ . Makin admits that, given his interpretation, the very invocation of the natural/non-natural distinction 'would be highly confusing' and that this passage therefore 'remains opaque' (Makin 2006, 217).

I hope to show that the appeal to natures does not make the arguments of  $\Theta.8$  opaque, but is rather the key to understanding them properly (see Section 5 below). To do so, I must first explore the account of *aither* and the heavenly bodies that Aristotle provides in *De Caelo* and 'modifies' in the *Physics* and *Metaphysics*.<sup>18</sup> In Section 4, I will discuss four principal claims:

1. *Aither's* capacity for circular motion is a natural, non-rational, one-way capacity (4.1).
2. *Aither's* capacity for circular motion is both unlimited and complete at all times (4.2).

18 There is a standard view according to which Aristotle's account of the cosmos develops in distinct stages (see, for example, Guthrie 1933; Ross 1936, 94-102; Judson 1994; and Graham 1996). In *De Caelo*, the outermost heavenly sphere is the source of all heavenly motion and this sphere is a self-mover. In *Physics* 8, Aristotle revises this view and argues that the outer sphere cannot be a self-mover; heavenly motion requires a distinct efficient cause, namely, the unmoved mover ( $\delta\ \sigma\acute{\upsilon}\ \kappa\iota\tau\omicron\upsilon\mu\epsilon\nu\omicron\nu\ \kappa\iota\nu\epsilon\iota$ ). In *Metaphysics*  $\Lambda.6-10$ , Aristotle expands his account of the unmoved mover and claims that it is also a final cause of heavenly motion insofar as it causes movement by being an object of desire or love. Finally, in  $\Lambda.8$ , he multiplies unmoved movers so that his theory is consistent with relatively well-established astronomical observations. The discussion that follows takes no hard stand on whether this developmental interpretation is correct (some recent and quite different ways of attacking the standard view are Kosman 1994, Bodnár 1997 and Matthen 2001). This is largely because the conclusions I wish to establish can be reached regardless of these differences. The account I provide will encompass the views of *De Caelo* and *Physics* 8. I will not adjudicate the difficult issue of whether the unmoved mover is already present, either implicitly or explicitly, in *De Caelo*. I will also largely prescind from issues that surround the unmoved mover's role as a final cause and the related claims about celestial souls. Again, this is not because I think these issues are unimportant, but because they will distract us from the main points I wish to establish.

3. *Aither's* status as natural is consistent with its movement having an unmoved mover as an efficient cause (4.3).
4. *Aither's* capacity for circular motion cannot fail to be exercised (4.4).

Although long, this discussion of *aither* is crucial to adjudicate between the pure actuality account and the capacity account.

#### 4.1 *Aither's Natural Capacity for Circular Motion*

##### 4.1.1 *Aither's* Natural, Non-Rational, One-Way Capacity for Circular Motion

In *De Caelo* 1.2-4, Aristotle argues that there is a fifth element, the first body (τὸ πρῶτον σῶμα), viz. *aither* (αἰθήρ), and that *aither* moves in a circle eternally according to its own nature.<sup>19</sup> For Aristotle's discussion of *aither* issues from this starting point: 'all natural bodies and magnitudes are in themselves, we say, mobile in respect of place; for we maintain that nature is a principle of movement in them (φύσιν κινήσεως ἀρχὴν εἶναι φάμεν αὐτοῖς)' (*De Caelo* 1.2, 268b14-17).

Although we will soon touch on the ways in which *aither's* natural motion differs from the natural motions of the terrestrial, simple bodies—earth, water, air and fire—it is useful to begin, as Aristotle himself does in *De Caelo* 1.2, by highlighting the ways in which *aither's* movement is like that of the other simple bodies.

The terrestrial, simple bodies can be the matter of hylomorphic composites; but they can, in principle, exist on their own as well. It is in this independent condition that one is best able to appreciate their natural capacities. The identity of a terrestrial, simple body is exhausted by its internal principle of movement and rest, i.e. its nature (*Phys.* 2.1, 192b13-14). This nature comprises a simple body's primary interactive and non-interactive tangible capacities insofar as these capacities are understood as being directed toward a determinate end (τέλος), viz. the complete realization of the simple body's form (or nature) itself.<sup>20</sup> The interactive, tangible capacities—hot/cold and wet/dry—are those capacities by virtue of which the simple bodies affect and are affected by other bodies with which they are in contact. The non-interactive, tangible capacities—heavy/light—are 'not said of things in virtue of their acting upon something else or being acted upon by something else' (*GC* 2.2, 329b20), but

19 I follow the widespread practice of identifying *aither* with the matter of celestial bodies. For some thoughtful reservations about this identification, see Falcon 2005, 115-21.

20 For a more thorough discussion of the simple bodies and their natures along these lines, see Frey 2007, 180-7.

are rather capacities for natural locomotion, that is, capacities to move to a determinate place.

So to understand a simple body is to understand its nature, and this is just as true of *aither* as it is for the terrestrial, simple bodies. *Aither's* nature is simpler than that of the terrestrial, simple bodies. Its internal principle of movement is effected through a single, non-interactive, tangible capacity—the capacity for circular movement around the center of the cosmos (*Cael.* 2.1, 269a5-7; 2.3, 286a8-12; *Meteor.* 1.2, 339a11-12).

This capacity for circular movement is a non-rational, one-way capacity. A rational capacity requires a desiderative principle if it is to issue in action. A doctor has to deliberately desire to heal (or harm) before her medical skill will issue in those actions conducive to health (or disease). This desiderative element, this deliberated desire (ὄρεξις ἢ προαίρεσις), is the source (κινήσεως ἀρχήν) of the capacity's exercise and it directs the capacity to one or the other of its two contrary outcomes.<sup>21</sup> A non-rational capacity, in contrast to a rational capacity, requires no desiderative principle. If a parcel of fire has the capacity to heat and the circumstances are appropriate, then the capacity is simply exercised (*GA* 2.4, 740b21-4). No further factor is needed; there is no indecision with respect to the exercises of non-rational capacities. So if (i) something possesses a natural, non-rational capacity, (ii) a suitable patient, if needed, is present, and (iii) there is nothing external to the agent and patient that would prevent the capacity's exercise, then its exercise will occur immediately (εὐθύς) and necessarily.<sup>22</sup> Although we still need to (and will) discuss the unmoved mover's role in *aither's* motion, we can say that *aither's* capacity for circular movement, like fire's capacity for upward movement—a paradigmatic one-way, non-rational, non-interactive, tangible, natural capacity—will be exercised as long as there is nothing external to prevent it from doing so.

#### 4.1.2 Why is there *aither* and why is *aither* Natural?

All natural movements must ultimately be explained in terms of the continuous, uniform motions of bodies which move so according to nature. There are only two basic types of motion: rectilinear movement (both away from and towards the center) and circular movement (about the center) (*Cael.* 268b16-20).

21 Cf. *De An.* 3.9, 433a4-6; *Metaph.* Θ.2, 1046b22-5, and Θ.5, 1048a10.

22 Strictly speaking, to add the qualification 'if nothing external prevents it' is not further necessary, since this would be contained in a complete specification of the relevant capacity (*Metaph.* Θ.5, 1048a16-21). But Aristotle often indulges in this unnecessary qualification (e.g. at *Phys.* 8.4, 255b3-31 and *MA* 8, 702a10-17), and the 'repetition' is, for present purposes, quite useful.

So if simple bodies are to fulfill this role, that is, if their movements (i) are such that they cannot deviate in those circumstances that allow for their unrestricted occurrence, and (ii) ultimately explain composite natural motions, then their natural motions must be either rectilinear or circular. In the absence of anything to prevent it, a simple body will move, as an exercise of a capacity for movement that (partly) composes its nature, either rectilinearly or circularly.

So a simple body's natural motion must be either rectilinear or circular, but why think that both of these disjuncts are realized? In particular, why should we think that there is a distinct kind of body that has circular motion as a natural movement? Aristotle (*Cael.* 269a2-9) argues that:

If there is such a thing as simple movement, and movement in a circle is simple, and the movement of a simple body is simple and simple movement belongs to a simple body (or even if simple movement belongs to a compound body it will belong according to that component which predominates), there must be a simple body that is such as to move in a circle according to its own nature. For although this may undergo the movement of another, different body by force, according to nature it cannot, if the natural movement that belongs to each of the simple bodies is single.

If the heaven's circular motion is a natural motion, then it will be a simple motion that belongs to a simple body. And circular motion cannot be a natural movement of the four terrestrial, simple bodies. For a simple body can have only one natural motion.<sup>23</sup> Since the four terrestrial, simple bodies already possess natural motions (fire and air naturally move away from the center rectilinearly and earth and water naturally move towards the center rectilinearly), they cannot also move in a circle naturally.

This gets us a bit closer. If there is natural circular motion, there must be a fifth simple body to which it belongs. But how do we discharge this antecedent? What warrants the claim that the circular motion of the heavens is natural? Aristotle (*Cael.* 269b3-10) says that:

if movement in a circle is locomotion according to nature for some particular body, it is clear that it would be a simple and primary one, such as to move in a circle according to its nature, just as fire moves upwards

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23 If this were not so, then a simple body's locomotive capacity would be akin to a two-way capacity requiring a desiderative principle to issue in movement.

and earth downwards. If those bodies that move in a circle move around contrary to nature, it would be amazing and completely absurd for this movement alone which is contrary to nature to be continuous and everlasting; for in other cases those bodies that move contrary to nature are observed to perish quickly.

So if the circular motion of the heavens is continuous and everlasting, i.e. if (i) the moving body and the motion remain the same (specifically) over a temporally unbroken duration (*Phys.* 5.4, 228b1-3), and (ii) this unbroken duration is without beginning or end, then it would be not only strange (θαυμαστόν) but downright absurd (παντελῶς ἄλογον) to think that it was contrary to nature.<sup>24</sup>

Aristotle thinks that the heavens' circular motion is indeed continuous and everlasting in this way. The justification for this claim has its source in a suitable analysis of repeated experience (ἐπαγωγή; Aristotle describes this method in *APo.* 2.19) in conjunction with a consideration of received doctrines (ἔνδοξα). Aristotle appeals to experience (ἐμπειρία) as a source of justification when he claims (*Cael.* 1.3, 270b12-16; cf. 1.5, 272a5-6 and 2.4, 287a11-12) that:

the things just said of the primary bodily substance are in fact well said (εἴρηται καλῶς). This also emerges with sufficient assurance from perception, in a manner sufficient at least for mortal belief, so to speak (ὥς γε πρὸς ἀνθρωπίνην εἰπεῖν πίστιν); for in the whole of past time, according to the memory passed on between generations, nothing is observed to have changed either in the whole of the outermost heaven or in any of its proper parts.

In addition, Aristotle notes that we 'see nothing coming to be spontaneously in the heavens' (*Phys.* 2.4, 196b2), that 'order and definiteness are much more plainly manifest in the celestial bodies than in our own frame' (*PA* 1.1, 641b18-19) and that there is, in the heavens, 'not the faintest sign of chance or disorder discernible' (641b23-4). These appeals to experience outside *De Caelo* occur in arguments that the heavenly bodies' motions are natural and occur for the sake of something rather than being due to chance and spontaneity. For Aristotle takes his opponent to concede that the orderly generation of living organisms entails that they come to be and persist as such by nature and for the sake of some end rather than by chance. But the heavens' movements are even more orderly and less prone to chance than is the generation of living organisms. So, *a fortiori*, the heavens are what they are and move as they do by nature.

24 Cf. 'the circular movement is natural, since otherwise it could not be eternal; for nothing unnatural is eternal' (*Cael.* 2.3, 286a16-17).

Elsewhere, Aristotle admits that evidence about the heavens and their movements is ‘furnished but scantily by sensation’ (1.5, 644b27). Nevertheless, the conceptions we derive from this limited evidence are among the most excellent, bring about considerable pleasure (644b22-645a1) and satisfy the explanatory demands appropriate to an investigation into eternal things (*Cael.* 3.7, 306a9-12).

Received doctrines provide further evidence that Aristotle’s conclusions are well said (εἴρηται καλῶς). For the ancient authorities state unanimously that the heavens are divine and so should be made of a matter that shares the attributes of the divine (2.3, 270b6-11). The word αἰθήρ itself provides further support insofar as Aristotle takes it to be etymologically derived from θεῖν ἀεί (‘runs always’, 270b21-5).<sup>25</sup>

In sum: the claim that there is fifth simple body, *aither*, and the attribution of natural, circular motion to this body are not justified *a priori* from geometrical considerations, but are arrived at though (i) an appeal to general principles about the dynamics of simple bodies, (ii) an application of those reliable experiential methods for developing conceptions of essences that enable one to determine the natures of things and (iii) a dialectical analysis of received doctrines.

## 4.2 *Aither’s Unlimited and Complete Motion*

### 4.2.1 *Aither’s Unlimited Motion*

*Aither’s* circular motion is in one sense complete and in another incomplete. Let us first discuss the way in which it is incomplete. A capacity’s account always contains a specification of its maximum. For ‘we always speak in relation to the maximum (πλείστον), e.g. capable of lifting one hundred talents or of walking one hundred stades (although one is also capable of achieving the parts within this maximum (ὑπεροχὴν), if one is also capable of achieving the maximum), since the capacity should be defined with respect to the end, i.e. the maximum’ (*Cael.* 1.11, 281a7-12). So for any activity or movement, φ, which can occur in degrees or occurs over time, there is, strictly speaking, no capacity simply to φ.<sup>26</sup>

25 This etymological account goes back to Plato (*Crat.* 410b6-8). Anaxagoras provides a different etymology—from αἰθεῖν, ‘to kindle’ (59 B2, 15 DK). Aristotle rejects this etymology at *Cael.* 3.3, 302b4-5 so as to remove support from the Anaxagorean assimilation of *aither* to fire.

26 Aristotle does not often follow this strict condition on capacity-specification in his physical, biological and ethical works and there are independent reasons to think it implausible: am I really continuously gaining novel capacities to run as I train for my first

*Aither's* capacity for circular movement is unlimited (*ἄπειρος*). But to say that a capacity is unlimited is among the ways one can satisfy the above condition on the proper specification of a capacity. Aristotle says: 'for all things are able either to act or to be acted upon, and to be or not to be, for either an unlimited or for a certain determined (*ὠρισμένον*) amount of time, and for an unlimited time for this reason, that unlimited time is in a way determined (*ὠρισταί πως*), being that than which there is no greater' (*Cael.* 1.12, 283a7-10). To say that a capacity to  $\varphi$  has no limit is not to specify a fixed and measurable quantity of time.<sup>27</sup> It is to say that the capacity is inexhaustible; it is a capacity to  $\varphi$  always, and this capacity cannot fail to be exercised at any time. So *aither's* circular motion is incomplete (or incompletable) in the sense that there is no intrinsic limit (*πέρας*) that would ever constitute a time that is its end.

That *aither's* circular motion is unlimited makes it a quite unusual movement (*κίνησις*). Unlike most movements, it does not involve progress from a state to its opposite. The terrestrial, simple bodies' rectilinear motions involve changes in place and have determinate end-points beyond them. Now, there is a manner of speaking according to which *aither's* circular motion has an opposed end-point as well. One can say that the place where the stars rise, the right pole, is the point from which their motion begins and that their movement is directed towards the left pole where they set (*Cael.* 2.2, 285b8-25 and 1.8, 277a24-6). But properly speaking this motion both begins and ends at the right (or the left, or any other arbitrary point along the circumference, cf. *Phys.* 8.9, 265a32-b2). Like other motions, *aither's* circular motion is specified in respect of from-where and to-where (*ποθέν ποί*). But both of these descriptions pick out the same point. For 'the place it [sc. circular motion] begins from and ends is the same' (*Cael.* 1.9, 279b3-4). So circular motion is unlike the rectilinear motions of the terrestrial, simple bodies because 'circular motion is motion of a thing from its place to its place, whereas linear motion is a motion from its place to another place' (*Phys.* 8.8, 264b18-19).

#### 4.2.2 The Completeness of *aither's* Motion

This last difference between *aither* and the terrestrial, simple bodies allows Aristotle to maintain that *aither's* uncompletable circular motion is, in

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marathon? But for present purposes, leaving this condition in place will allow us to see clearly what it is for *aither's* capacity for circular motion to be unlimited.

27 So Aristotle is not committed to there being an actual infinity or to there being a finite body that possesses an infinite capacity. Aristotle raises these worries in *Physics* 3.6 and 8.10, respectively. See Bogen and McGuire 1986, 407-15 for a nice discussion of why Aristotle's account does not entail these problematic consequences.

different sense, complete. A terrestrial, simple body's rectilinear motion is incomplete, and is only completed when it reaches the location that is its locomotive capacity's end. *Aither's* circular movement, in contrast, shares many of the features of an *energeia*, in the sense in which Aristotle contrasts ἐνέργεια and κίνησις at *Metaph.* Θ.6, 1048b18-36. At all times, the exercise of *aither's* capacity for circular movement (i) is continuous with its previous exercise, (ii) is characterized appropriately as arising from a capacity that is both being exercised and has been exercised, and (iii) requires nothing more at a later time to perfect itself since it is not a movement toward an external and opposed end. Perhaps one goes too far if one concludes that *aither's* circular movement is not a κίνησις at all.<sup>28</sup> But however one adjudicates that issue, it is clear that *aither's* motion is, like other *energeiai*, complete at every moment it occurs. So at all times, *aither* completely and fully exercises a capacity to do something that is never ending and is without limit.<sup>29</sup>

#### 4.3 *Aither and the Unmoved Mover*

In *Physics* 8.4, Aristotle famously argues that the simple bodies are not self-movers. Although natural, the movements of simple bodies have external, efficient causes. This holds for *aither* as well since Aristotle's main argument turns on the simple bodies' material continuity—a feature that prevents them from having the internal moving and moved components that are required for self-motion—and *aither* exhibits this material continuity as well.<sup>30</sup>

Sarah Broadie maintains that being natural and having an external mover are incompatible and goes so far as to deny that heavenly bodies possess natures

28 Gill 1991, 33-4 suggests that *aither's* circular motion is an *energeia* and Bogen and McGuire 1986, 415 *ff.* contains a strong case for this view. The argument at Bodnár 1997, 115 that *aither's* motion is a *kinēsis* because it can be analyzed as the serial actualization of a capacity to travel small distances about its circumference strikes me as wrong. Whenever Aristotle discusses the from-where and to-where of this capacity for movement, he specifies a single point (although 1050b20-2 complicates this slightly, and we will discuss this in Section 5 below). I am still hesitant to deny that it is any way a *kinēsis* given that Aristotle refers to it as such throughout *De Caelo*, *Physics* 8 and elsewhere. Although it belongs to something that is among τὸ φερόμενον (*Phys.* 8.8, 261b28-31) it is, unlike all other *kinēseis*, not ἐντελέχεια κινήτου ἀτελής.

29 Bogen and McGuire express this well when they say that 'the ability that enables the cosmos to do what it does is actuality in the sense that at each moment in its endless career the cosmos is completely exercising its ability-to-rotate-always' (1986, 420).

30 Aristotle makes this claim about the terrestrial, simple bodies at *Phys.* 8.4, 255a12-18, b29-31; *MA* 5, 700a16; 6, 700b6; *IA* 3, 705a19-25; and *De An.* 1.4, 409a1-3, 10-14.

at all.<sup>31</sup> One reason to think that it is especially difficult to treat *aither's* movement as natural is that *aither*, unlike the terrestrial, simple bodies (whose natural movement also has an external efficient cause), never has an autonomous phase. That is, the efficient cause of a terrestrial, simple body's natural motion is the simple body's generator (often interpreted as being the body from which it came to be), but once the simple body has come to be it moves on its own toward its proper (ὀικεῖος) location without any further external efficient causal influence as long as nothing prevents it from doing so.<sup>32</sup> *Aither's* motion, however, has no autonomous phase. The unmoved mover exerts its causal influence upon *aither* continuously and uniformly.

But regardless of how we are to understand the autonomous phase of a simple body's motion, neither the absence of an external, efficient cause nor the possibility of an autonomous phase of motion are necessary for a movement to be natural. Something is moved by nature if one must, in order to explain the movement properly, appeal to a principle that is internal (ἐντός) to that which moves. A movement is due to an internal principle if and only if (i) one must appeal to facts about the form or kind (εἶδος) of the entity to which the principle is internal in order to properly explain the movement, and (ii) the entity to which the principle is internal is the movement's proper subject.<sup>33</sup> The characteristic movements of both the terrestrial, simple bodies and *aither* are, despite having external efficient causes, movements of the bodies themselves. The simple bodies possess their capacities for movement *per se* (*Phys.* 2.1, 192b35-6), the exercise of these capacities 'brings to actuality the proper activities that they potentially possess' (8.4, 255a29-30), and the movements that are the exercises of such capacities exhaust what it is for the simple bodies to be (formally) what they are most fully (*Cael.* 4.3, 310a33-4; cf. ἐντελεχειάς at 311a3 ff., and see Section 6 below). Aristotle grants that the simple bodies' capacities for movement are *passive* capacities. A simple body 'contains within itself a principle of movement—not of moving something (κινεῖν) or of acting (ποιεῖν), but of being affected (πάσχειν)' (*Phys.* 8.4, 255b30-1). But there is nothing that prevents natural capacities from being passive in this way.

So the fact that *aither's* circular motion requires the continuous efficient causation of a distinct and transcendent unmoved mover does not undermine

31 See Waterlow [= Broadie] 1988, appendix to ch. 5. Furley 1978, Cohen 1994, Graham 1996 and Matthen 2001 raise similar concerns.

32 Aristotle thinks that removers of hindrances are, in a sense, also external, efficient causes of a simple body's movement to its proper location (*Phys.* 8.4, 255b22-6). But if there are no hindrances, this movement needs no continuous, external efficient causation to occur.

33 This understanding of what it is for a movement to be by nature is heavily influenced by Kelsey 2003.

its status as natural and does not prevent one from giving explanations of this movement that parallel the explanations of the terrestrial, simple bodies' movements: *aither* moves circularly by virtue of the exercise of a passive, non-rational, natural capacity and this capacity for circular movement will be exercised as long as there is nothing external to prevent it from being so.

#### 4.4 *Aither's Necessary Motion*

*Aither's* capacity for circular motion is natural, so nothing else about *aither* must be invoked to explain why this capacity is exercised. *Aither's* nature is the principle of its sustained movement and it will continue to exercise its natural capacity as long as nothing external interferes. Moreover, the exercise of this natural capacity does not alter *aither* in any way. In particular, its exercise does not alter *aither* in such a way as to prevent or modify its further exercise. But this is just as true of seeing, or living, or any other *energeia* (in the sense in which Aristotle contrasts *energeia* with *kinēsis* in Θ.6). Why can't *aither's* capacity for circular movement, like these other capacities, fail to be exercised?

*Aither*, Aristotle argues, cannot be changed or affected by anything else in the natural order. In particular, it cannot be forced to move non-circularly against its nature. And in the absence of anything to prevent its exercise, a natural, non-rational capacity is exercised of necessity. Aristotle (*Cael.* 1.3, 270a12-23) says that:

it is reasonable (εὐλογον) to assume of it [sc. *aither*] that it is ungenerated and imperishable and incapable of growth and alteration, due to the fact that everything that comes to be does so both from a contrary and from some underlying thing, and perishes similarly with some underlying thing and by the action of a contrary and into a contrary, as was said in our first accounts; and the locomotions of contraries are contrary. If, then, *there cannot possibly be a contrary to this body due to the fact that there cannot even be a movement contrary to locomotion in a circle*, nature seems rightly to have set what was to be ungenerated and imperishable free of contraries; for generation and corruption occur among contraries.

There is no opposite motion, no motion opposed to circular motion, which the *aither* could undergo either by nature or by force. This is why it is reasonable (εὐλογος) to think that *aither* is, among other things, imperishable.

Aristotle proves that there is no contrary motion to circular motion by cases. Rectilinear motion cannot be contrary to circular motion. For 'rectilinear locomotions are opposed to one another because of their places; for up-down is both a specific difference and a contrariety of place' (*Cael.* 1.4, 271a4-5). And counterclockwise circular motion is not contrary to clockwise circular motion.

For contrary motions are determined by their having contrary starting and end-points and circular motion, as we have seen (Section 4.2.1 above), is always both from and to the same location (271a19-21).

Moreover, and perhaps more importantly, if natural motions are genuinely contrary, they must not just be directed to contrary locations, but must be able to impede and constrain each other. And Aristotle (*Phys.* 271a22-33) thinks that:

even if locomotion in a circle were contrary to locomotion in a circle, one of them would be in vain; . . . for if they were equal, a movement would not arise from them, whereas if one of the movements held sway, the other would not occur. As a result, if there were two bodies, one of them, in not performing its movement, would be in vain; for we say of a sandal which is not worn that it is in vain. God and nature, however, do nothing in vain.<sup>34</sup>

Aristotle is here considering a single body whose movement would be the result of natural capacities for both clockwise and counterclockwise motion. If it possessed a capacity for counterclockwise motion, this capacity would either be commensurate with its capacity for clockwise motion or incommensurate. If they were commensurate, it would result in there being no motion at all. That this is not the case is empirically verifiable. If they were incommensurate, the weaker would never be exercised. And Aristotle thinks that a body that possesses a natural capacity that can never be exercised could never come to be by nature.<sup>35</sup>

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34 I follow Leggatt 1995, 185 and others in transposing lines 271a23-8 to follow 271a19.

35 Another relevant consideration is Aristotle's argument in *De Caelo* 1.12 that whatever is capable of being for an unlimited time cannot perish (or come to be). Aristotle claims that *aither* cannot, in addition to possessing a capacity to move in a circle eternally, possess a capacity to not move in a circle eternally (281a34-b2). The argument is, very roughly, as follows. If a body possessed both capacities, it could not exercise them simultaneously. That would be straightforwardly contradictory. So if it were to exercise both, it would have to exercise them consecutively. But this would require two unlimited stretches of time and this is impossible. For something is an unlimited stretch of time only if it is larger than all other stretches of time and smaller than none. So if both capacities were exercised for an unlimited stretch of time, the time each was exercised would have to be larger than the other. This is impossible. And Aristotle has already determined that *aither* is capable of moving in a circle for an unlimited time (and will, given that nothing is capable of preventing it from doing so). So this precludes it from having the capacity to not move circularly for an unlimited time. For similar reasons, it can't have the capacity to

So *aither's* circular motion is natural and there is nothing (neither *aither* itself nor anything else) that possesses one or more capacities whose exercise would make *aither* move in any way that is contrary to its natural motion. Aristotle proposes two meanings for 'incapable' (ἀδυνατόν) in *Metaph.* Δ.12. According to the first, something is ἀδυνατόν if it requires one or more *dunameis* to be exercised and nothing possesses the relevant *dunameis* (1019a33-b21). According to the second, something is ἀδυνατόν if it is necessarily false (1019b21-30), that is, if it violates the law of non-contradiction (Γ.3, 1005b18-20). The sense of ἀδυνατόν relevant to the quiescence of *aither's* capacity for circular motion is the first variety. *Aither's* capacity for circular movement cannot fail to be exercised because such a failure would require the exercise of capacities by one or more things and nothing possesses the relevant capacities. And in the absence of anything to prevent its exercise, *aither's* natural, non-rational capacity to move circularly without limit is exercised of necessity.

## 5 The Θ.8 Challenge

Aristotle makes numerous additional claims about *aither* and the heavenly bodies that we will not pursue.<sup>36</sup> But given what has been said so far about *aither*, what are we to make of the challenges that the pure actuality account raises? One thing is clear: Aristotle is, at least in *De Caelo*, entirely comfortable attributing imperishability to entities whose movements have a nature as their principle. Indeed, the arguments of *De Caelo* 1.12 for the heavenly bodies being ungenerable and imperishable presuppose that their movements

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not move circularly for a limited time either. Given that Aristotle thinks that if something  $\varphi$ -s for an unlimited time, then it cannot cease  $\varphi$ -ing unless it also possesses a capacity to not- $\varphi$  (281b19-25), it follows that *aither's* circular motion, and hence *aither* itself, cannot cease to be. And that which cannot cease to be, cannot come to be either (281b27-34).

36 Again, the most notable among these further claims is that celestial souls play some role in the explanation of heavenly motion (*Cael.* 2.12, 292a18 ff.) and that the unmoved mover causes movement by being an object of desire or love (*Metaph.* Λ.7, 1072b3). These commitments complicate Aristotle's ultimate picture in fascinating ways, but they can be integrated into what follows without undermining our main conclusions. For being a final cause is not incompatible with being an efficient cause (*Phys.* 2.7, 198a24-9, *pace* Kahn 1985) and possession of a soul, regardless of whether it is the heavenly bodies, the (outermost) cosmic sphere or the οὐρανός considered as a totality that is under consideration, neither entails the complexity required for self-motion nor is incompatible with *aither's* movement being the exercise of a passive, natural capacity (cf. Gill 1991, 30 n. 44).

are eternal. And the eternality of this unlimited movement is, as we have seen (Section 4.1.2), among the grounds for the claim that the movement is natural. *Aither's* movements are, in many respects, to be understood in the same way as the movements of the terrestrial, simple bodies. They are movements that arise from an internal, natural principle. And, I contend, this natural movement is, as it is in the terrestrial, simple bodies, the activity or exercise of a *dunamis*.

The conception of these movements as natural is not, I have argued, something that one can reject. One could not account for the uniformity, continuity and eternality of these movements without invoking a nature. Indeed, to do otherwise would be, according to Aristotle, 'amazing and completely absurd' (*Cael.* 1.2, 269b8). Therefore Makin and Beere must maintain, given their other commitments, that these natural movements, unlike the natural movements of the terrestrial, simple bodies, are not the exercises of any *dunamis*. In Section 6, I will provide a general argument against severing the tie between natures and capacities. But we are already in a position to speak to the specific challenges Makin and Beere raise in their defenses of the pure actuality account. I will first take up these concerns (Section 5.1), and then return to Aristotle's argument in  $\Theta$ .8 and defend the capacity account (Section 5.2).

### 5.1 *Capacities and Explanation*

The appeal to capacities in *De Caelo's* account of eternal movement is not explanatorily otiose. The first charge on this score is that an appeal to an eternally exercised capacity could play no role in explaining why the capacity is exercised eternally. Makin says this (2006, 214):

If we attribute to A a capacity (potentiality) which is necessarily and externally exercised (actualized), . . . the capacity serves no explanatory purpose. In particular, it does not explain why A is eternally (F). In order to explain that one would need to say *why* the capacity (potentiality) is eternally and necessarily exercised (actualized). If that is just a brute fact, then one may as well stick with the brute fact that A is eternally (F), and exclude the capacity (potentiality) from the picture altogether.

We can disarm this objection by noting that capacities do exactly the same explanatory work in both terrestrial and heavenly contexts and that, in both contexts, the explanation of why a body moves when it does involves more than an appeal to a 'brute fact'.

To explain which movements are the exercises of a terrestrial, simple body's natural capacities, one need not appeal to anything other than these capaci-

ties. As Aristotle says, ‘to ask why fire moves upward and earth downward is the same as to ask why the healable, when moved and changed *qua* healable, attains health and not whiteness’ (*Cael.* 4.3, 310b16-19).<sup>37</sup> But to explain why such a capacity is exercised at a time, one also needs to invoke the circumstances in which the body is situated at that time. Fire’s locomotive capacity, unlike its capacity to heat, does not require a patient. So the only external feature that needs to be invoked to explain why a parcel of fire moves upward when it does is that there is nothing present that would prevent its locomotive capacity’s exercise.

We can explain *aither*’s circular motion similarly. *Aither*’s locomotive capacity explains why its movement is circular. But the explanation of why this capacity is exercised eternally requires more than an appeal to the capacity. Like fire’s locomotive capacity, *aither*’s locomotive capacity does not require a patient to be exercised. So the only external feature that needs to be invoked to explain why *aither* moves circularly when it does is that there is nothing present that would prevent its locomotive capacity’s exercise. And Aristotle, as we have seen (Section 4.4 above), argues that there is nothing that could ever prevent *aither*’s locomotive capacity from being exercised. This does not constitute a *petitio principii*, since the eternality of this capacity’s exercise is not due to anything special about the capacity *qua* capacity. ‘Eternal’ does not mark some special subclass of capacities; it is attributed to the capacity in virtue of the consequences that follow from what the capacity is for, namely unlimited circular motion. There is nothing fundamentally different between the role a capacity for motion, *qua* capacity, plays in the explanation of the character and duration of fire’s movement and in the explanation of the character and duration of *aither*’s movement.

The second charge of explanatory otiosity follows from the claim that capacities are explanatorily useful only insofar as their exercises are intermittent. Makin says: ‘one reason to take capacities and potentialities seriously is that they provide explanatory continuity between items which would otherwise be inexplicably independent. To that extent there is no reason to introduce capacities and potentialities in cases which do not involve episodic discontinuity’ (Makin 2006, p. xli).<sup>38</sup> And Beere says that ‘the very point of the concept of a capacity, which the Megarics failed to grasp [is that] capacities

37 This autonomy in function-attribution depends on the simple bodies being natural unities as opposed to parts of a larger natural unity. See Frey 2007, 171-5 for further discussion of this point.

38 Again, ‘potentialities (capacities) are useful precisely because they can persist even when unactualized (unexercised)’ (Makin 2006, 214).

are the intrinsic properties of things that constitute their ‘complete readiness’ to be agents or patients in changes that sometimes do and sometimes do not occur’ (Beere 2009, 321-2).

I do not want to deny that capacities serve this explanatory role. The Megarians’ fundamentally flawed world-view indeed stems from their inability to understand the role that capacities play in explaining why a change or activity occurs when it does and in explaining why otherwise independent and discontinuous movements and activities are united as exercises of a single, persistent principle. But the fact that *aither’s* capacity for circular movement is never quiescent does not entail that it is not present. In fact, Aristotle is perfectly willing to consider what would happen if, *per impossibile*, the heavens’ circular movement were intermittent. When discussing how to attribute left and right to an eternally-moving, spherical cosmos that comprises identical parts, Aristotle draws an analogy to the heaven’s principle of movement (*Cael.* 2.2, 285b1-7):

One must think of it [sc. τὸ πᾶν] as though it were a thing in which right differs in relation to left, even in configuration, but about which a sphere has then been placed; for it will keep the difference in function, but will appear not to have it on account of the uniformity of its configuration. *One may speak in the same way concerning the source of movement* (ἀρχῆς τοῦ κινεῖσθαι); *for even if it never began to move, nonetheless it must* (ἀναγκάϊον) *have a source from which it would have begun if it had begun to move, and, if it were to come to a halt, from which it would begin to move again.*

Whether or not this argument succeeds in securing for the cosmos the sort of functional differentiation of left and right that is most appropriate to biological contexts (*IA* 4, 705b17-18), we cannot overstate the importance of the counterfactual reasoning the argument employs to our guiding question about eternal motions.<sup>39</sup> Since there is never a time at which *aither* is not already in motion, the initiation of *aither’s* circular movement will never be apparent to

39 Aristotle often uses counterfactual reasoning of this sort in arguments about the natural capacities of simple bodies. Sometimes, as in the present case, the counterfactual situation is impossible. For example, (i) Aristotle considers how the simple bodies would move in another world as part of an argument that there could be no other world (1.8, 276a30-b14), (ii) he considers what would happen ‘if one were to remove the earth to where the moon now is’ (4.3, 310b2-5), and (iii) he claims that if *aither* were to be moved non-circularly, it would be moved by force despite there being nothing that could possibly move it so (1.2, 269a2-9).

us. We must nevertheless conceive eternally-moving *aither* as possessing the principle that *would* initiate such movement. A locomotive capacity is present even in those things that move eternally. This eternally-exercised locomotive capacity *would* (in part) explain the initiation of the heaven's circular motion at a time in the same way that an intermittently-exercised, locomotive capacity *does* (in part) explain the initiation of a simple body's movement at a time. So to insist on attributing capacities that cannot fail to be exercised to the heavenly bodies is not merely 'to insist on a form of words' (Makin 2006, 214). For it is only by doing so that we properly understand the principle of those movements that exhaust what it is for a heavenly body to be.

### 5.2 *A Modest Interpretation of Θ.8*

The capacity account is not only able to overcome the challenges that the arguments for the pure actuality account raise; it also makes better sense of Aristotle's argument in Θ.8 than the pure actuality account does. I suggested earlier (Section 2 above) that Aristotle does not argue in Θ.8 that eternal things have no capacities at all; his conclusion is that it is necessary that eternal things have no unexercised capacities. This fits well with Aristotle's primary reason for putting forward this argument in the first place, namely to overcome the problems that would arise for the claim that *energeia* is prior in substance to *dunamis* if the *dunamis* of eternal things could be without the corresponding *energeiai* being as well. But this worry does not arise for *aither* and the heavenly bodies. *Aither's* capacity for eternal circular motion is exercised necessarily. This is not a case in which a capacity can be without the corresponding *energeia*. So the fact that *aither* possesses a capacity for movement poses no obstacle to Aristotle's priority thesis.

We should therefore take *dunamis* in Aristotle's premise (A1), that 'every *dunamis* is simultaneously for the contradictory' (1050b9-10), to mean 'not-necessarily-exercised *dunamis*'. It is capacities that satisfy this description, the familiar, possibly-not-exercised capacities of terrestrial bodies, that would lead to problems. But not *every* capacity is for the contradictory; not *every* capacity may fail to be exercised. If *aither* possessed capacities that were not exercised necessarily, then Aristotle's argument would be applicable. But *aither* does not possess capacities that may fail to be exercised.

What Aristotle says in (A6), that 'nothing which is without qualification imperishable is *dunamei* without qualification' (1050b16-17), remains true. Being an F *dunamei* and being an F *energeiāi* are mutually exclusive manners of being.<sup>40</sup> If something were simultaneously an F in both of these manners, it

40 Cf. *Phys.* 3.1 201a20-3, b6-15, and *Metaph.* Θ.6, 1048a30-1. The distinction between being *dunamei* and being *energeiāi/entelecheiāi* is orthogonal to the classification of things

would be, at one and the same time, fully and incompletely an F. The exclusivity that governs these manners of being is not analogous to the exclusivity that holds for instantiations of contrary properties; it is analogous to categorical exclusivity. Just as it is incorrect to say of something that it is both a substance and a quality, it is incorrect to say of something that it is both an F *dunamei* and an F *energeiāi*. So if something is an F *energeiāi* and, by necessity, is an F in this manner of being eternally, then it will never be an F *dunamei*.

But this raises no problems for Aristotle. For to be something *dunamei* entails the possession of one or more capacities (Θ.7), but to possess a capacity does not entail that something is (or can be) *dunamei*. And although nothing can simultaneously be an F both *dunamei* and *energeiāi*, something can simultaneously possess a capacity and exercise it (Θ.3). So Aristotle can consistently say that *aither's* movement is the exercise of a capacity, that it possesses this capacity while it is being exercised, that this movement is eternal necessarily, and that *aither* is what it is *energeiāi* and possess this manner of being, and only this manner of being, necessarily.

Aristotle's claim (A11), 'nor if there is an eternally-moved, is it moved in accordance with capacity (κατὰ δύναμιν κινούμενον) except for from-where and to-where (ποθὲν ποί) (for nothing prevents there being a matter for this)' (*Metaph.* 1050b20-2), is also compatible with the capacity account. Aristotle is clear that 'it is not necessary if a thing has matter for change of place (τι ὕλην ἔχει τοπικὴν) that it should also have matter for generation and destruction' (*Metaph.* H.1, 1042b7-8) and goes on to say that 'natural but eternal substances . . . [have matter] only such as can be moved in respect of place' (H.4, 1044b6-8).<sup>41</sup> Indeed, *aither* does not have matter for generation given that it can never come to be. But it does have a capacity for circular movement. To possess such a capacity is to possess topical matter (ὕλη τοπική).<sup>42</sup> And to be *aither energeiāi*, for *aither* to completely realize its form, simply is for this capacity to be exercised. Aristotle is not attributing being-in-capacity to the heavenly bodies in (A11). He does not say that the eternally-moved is δυνάμει in any way, but

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that are (τὰ ὄντα) that Aristotle presents in the categories (cf. Θ.1, 1045b28-36 and Θ 10, 1051a34-b2).

- 41 Again, 'of eternal things, those which are not generable but are movable in space have matter—not matter for generation, however, but for motion from one place to another' (Λ.2, 1069b25-6; cf. *Cael.* 4.4, 311b33).
- 42 The matter that serves as the substratum of coming to be and passing away is matter in its primary sense (κυρίως, GC 1.5, 320a2-4). The matter of eternal sensible substance is something other than (ἑτέρον, *Metaph.* Λ.2, 1069b25) that of perishable substance, which possesses matter in its primary sense. This distinct matter, ὕλη τοπική, although not matter in its primary sense, is nevertheless a genuine kind or variety of matter (cf. Fazzo 2013).

rather that it is moved in one specific way, *κατὰ δύνανμιν*. And Aristotle, I have argued, has a perfectly good account of a heavenly body's circular movement being *κατὰ δύνανμιν* in this one exceptional way: this movement is the exercise of a locomotive capacity that is specified, as all locomotive capacities are, in terms of from-where and to-where.<sup>43</sup>

The capacity account gains further support from Aristotle's direct comments about heavenly bodies in (A12) (1050b22-28):

Therefore the sun and stars and the whole heaven are always active and there is no fear that they may sometime stop, as those who study nature fear. Nor do they tire in doing this; for movement does not concern for them, as it does for perishable things, a capacity for the contradictory, so that the continuity of movement is laborious. For the cause of this is substance which is matter and capacity, not *energeia*.

I already mentioned Makin's puzzlement over this passage (Section 4 above). Beere also thinks that 'it is unclear' why Aristotle would be committed to the claim that all capacities are laborious in the sense of wearing out over time (Beere 2009, 322). Here is Beere's interpretation (322-3):

If we assume that every capacity worthy of the name is distinct from its corresponding *energeia*, and we assume that the exercise of every capacity involves *interaction* with other things, then every exercise of a capacity is laborious because its interaction with the environment constitutes some resistance to its exercise, and this resistance will, especially in continuous changing, wear out the capacity... So capacities wear out through being exercised, because their matter is acted on whenever the thing is active.

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43 If forced to read *κατὰ δύνανμιν* as having the same meaning as *δυνάμει* (dative case, with adverbial force), I would prefer Beere's interpretation according to which the eternally-moved is *δυνάμει* located at a place it is not at presently but will be, rather than Ross's interpretation according to which it is *δυνάμει* moving along a segment of its circumference it is not traversing presently but will be (Beere 2009, 318-19 and Ross 1936, 265, respectively). Neither of these alternative interpretations commits Aristotle to the view that *aither's* circular motion can be analyzed in terms of smaller motions or that *aither* possesses a potentially infinite number of capacities to be in various locations or traverse various paths along its circumference. But again, I do not think any of this is required by (A11) (although one might argue that (A7) suggests the more complicated reading).

But not every capacity's exercise involves interaction with other things. This is not just because some capacities are not capacities to affect or be affected by a distinct body. Fire's locomotive capacity, for example, is not an interactive capacity. But a parcel of fire will still typically encounter some external resistance in the course of its upward trajectory. The external bodies it encounters will inhibit the exercise of its non-interactive, natural capacity for movement. But Aristotle argues explicitly that there is nothing that could ever constitute resistance (forced counter-natural movement) to the exercise of *aither's* capacity for circular movement. Beere's assumption that the exercise of *every* capacity involves interaction with other things is false of the very case at issue.

I think it is better to maintain Aristotle's original analysis from *De Caelo*. The reason that *aither's* motion is not laborious is that this motion is natural and is free from external constraint (2.1, 284a14-18, 27-35). *Aither's* movement does not involve a capacity for the contradictory. Only capacities for the contradictory, i.e. capacities that are not exercised necessarily, have contraries. And 'it is on contraries that generation and destruction depend' (2.3, 270a22). But it does not follow that *aither's* movement involves no capacity at all. *Aither* does possess a natural capacity for circular movement and it is this capacity that is exercised eternally and without labor.

## 6 On Natures and Capacities

I would like to conclude the positive case for the capacity account by highlighting the role capacities play in understanding what it is to possess a nature. This discussion should not only raise concerns for those who happily sever natures and capacities, but will ground the capacity account in a broader understanding of capacities' ineliminable explanatory role in the natural order.

When Aristotle discusses the kinds of *dunameis* to which the slogan '*energeia* is prior to *dunamis*' applies, he includes natures. He says (*Metaph.* Θ.8, 1049b5-10):<sup>44</sup>

I mean by *dunamis* not only that definite kind which is said to be a principle of change in another thing or in a thing *qua* other, but in general every principle of movement or of rest. For nature too is in the same class

44 λέγω δὲ δυνάμειος οὐ μόνον τῆς ὀρισμένης ἢ λέγεται ἀρχὴ μεταβλητικῆ ἐν ἄλλῳ ἢ ἢ ἄλλο, ἀλλ' ὅλως πάσης ἀρχῆς κινητικῆς ἢ στατικῆς. καὶ γὰρ ἡ φύσις ἐν ταυτῷ [γίγνεται· ἐν ταυτῷ γὰρ] γένοι τῇ δυνάμει· ἀρχὴ γὰρ κινητικῆ, ἀλλ' οὐκ ἐν ἄλλῳ ἀλλ' ἐν αὐτῷ ἢ αὐτό.

as *dunamis*; for it is a principle of change, though not in something else but in a thing itself *qua* itself.

Perhaps this passage is of limited value since it occurs in the chapter's first half which focuses exclusively on the various ways *energeia* is prior to *dunamis* for perishable beings. But I think this passage, once it is properly understood, sheds light on what it is for something to possess a nature or to be by nature more generally.

When I first described the tension in Aristotle's views about capacities and activities, I gave some reasons that would make it plausible to think that natures are a kind of *dunamis*. And as we have just seen, Aristotle is, on at least one occasion, willing to make this identification. Natures and capacities are indeed intimately connected. But it is, strictly speaking, a mistake to say that a nature is (or is primarily) a kind of *dunamis*. A thing's nature should be identified primarily with its form.

This comes out clearly when Aristotle attempts to specify what it is in something that moves by virtue of an internal principle that is its nature (*Phys.* 2.1, 199a9ff.). There are two promising options: (i) the first underlying matter of a thing and (ii) the shape and form that is given in a thing's definition (193a28-31). At 192b33-4, Aristotle says that things that have natures are substances.<sup>45</sup> But he quickly slides, without noting that he has done so, to speaking about 'the nature and substance of things due to nature' (ἡ φύσις καὶ ἡ οὐσία τῶν φύσει ὄντων, 193a9). This is understandable since both those who appeal to the underlying matter and those who appeal to form take something's nature to be its substance in the sense of being that which is permanent and persists through change.<sup>46</sup>

If a thing's nature is its substance, then one should identify nature with form rather than matter. Aristotle says that 'the form indeed is nature more than

45 Strictly speaking, the simple bodies are not substances. For 'none of them is one, but they are like a heap before it is fused by heat and some one thing is made out of the bits' (*Metaph.* Z.16, 1040b8-10). This is not to say that the simple bodies do not have forms or natures. It is simply to say that the criterion of identity that their form or nature provides is not also a principle of individuation that would enable us to treat the simple bodies as countable unities (see Frey 2007, 180-1). But although a simple body is not *one* nature, it is nevertheless one *in* nature (cf. I.1, 1052a20). Its movements arise from a single, unitary, internal principle of movement and rest. This is enough for natures to qualify as substances in the present context.

46 For even those who appeal to bronze, gold, water, bones, wood, earth etc. take these to be the 'nature and substance' of that which they are the matter (193a20).

[or: rather than (μᾶλλον)] the matter'.<sup>47</sup> Aristotle offers three reasons for this claim. First, having a nature and having a form are coeval, since it is only when something acquires its form in actuality that it is most properly called what it is (193a32-b8). Secondly, that which possesses a shape or form by nature comes to be as such from something that possesses the shape or form in actuality (193b8-12). Thirdly, when something with a nature comes to be, we think of φύσις as a 'road towards nature' (ὁδὸς εἰς φύσιν, 193b12-18). That is, nature is the end toward which this 'road' is directed, namely the shape and form of that which comes to be.

If nature *qua* form is primary, why must natural bodies possess capacities? In order to understand why a natural body must possess capacities, one must understand what it is for a nature to be a final cause and it is instructive to begin with natural bodies that are susceptible to generation.

While arguing that the student of nature must know all four causes, Aristotle claims that three of these causes—the formal (τὸ εἶδος), the efficient (τὸ κινήσαν), and the final (τὸ οὐ ἔνεκα)—often come to one since the formal and the final causes 'are one' while the efficient cause is the same as these 'in form'.<sup>48</sup> Everything that occurs by nature occurs for the sake of some end.<sup>49</sup> More precisely, it is natures themselves that Aristotle says are for the sake of an end (198b4-5, 199a11-12). The formal and final causes are one because 'the essence of a thing, i.e. the form for this (τὸ τί ἐστίν καὶ ἡ μορφή) is the end or that for the sake of which' (198b2-3, cf. 2.8, 199a30-4). So if a nature is directed towards an end and this end, the form, is something's nature, then a nature is directed toward itself. Natural movement is therefore a kind of formal perfection; it is movement that constitutes the (further) realization or perpetuation of something as the kind of being it is. Nature is a beginning of a change only if it is the change's end, that is, only if the change, when nothing interferes with it, results in that for the sake of which the change occurs, namely, the (further) realization or perpetuation of the nature *qua* form itself (2.8, 199b9-26).<sup>50</sup>

47 193b6-7. Cf. *PA* 1.1, 640b29 and *GC* 2.9, 335b35-336a1.

48 ἔρχεται δὲ τὰ τρία εἰς [τὸ] ἓν πολλάκις· τὸ μὲν γὰρ τί ἐστὶ καὶ τὸ οὐ ἔνεκα ἓν ἐστὶ, τὸ δ' ὄθεν ἢ κινήσεις πρῶτον τῷ εἶδει ταῦτό τούτοις (2.7, 198a24-6).

49 Cf. *Phys.* 2.5, 196b21; 2.7 198b4-5; 2.8, 199a7, 11-12, 30-4; 199b9-26; *De An.* 3.12, 434a31-2; *Somn.* 2, 455b16-17; *PA* 1.1, 641b11-14 and 641b23-642a1.

50 See also *PA* 1.1, 641b23-642a1. The further question of how a nature that is form and end is also both an efficient cause and an unmoved principle of movement, is a difficult one that I will not answer here. I have benefited greatly in understanding this further question, as well as our present concerns about the identification of nature with form, through Kelsey *forthcoming*.

Even though a natural body's formal and final causes coincide, they are still different causes. The questions 'What is it?' and 'For the sake of what is it?' receive the same answer, but they are nevertheless distinct questions. In introducing the final cause, we focus our attention not just on what something is but on what it is about something in virtue of which it can be for the sake of what it is. For something to possess a nature is for that nature to be both the beginning and end of its natural movements. This is why it is appropriate to think of a nature as a 'road towards nature'. Nature is beginning, path and end. It is appropriate, then, to ask what it is about a natural body that enables it to have its form as an end in this way. What is it in a natural body that stands to its end as being in need of further realization or completion? What is it in a natural body that strives for being?

Aristotle's answer to these questions is matter. For there is a secondary, though legitimate, sense in which matter is nature as well. Aristotle says (*Phys.* 1.9, 192a16-22):

For admitting that there is something divine, good, and desirable, we hold that there are two other principles, the one contrary to it, the other such as of its own nature to desire and yearn for it . . . Yet the form cannot desire itself, for it is not defective; nor can the contrary desire it, for contraries are mutually destructive. The truth is that what desires the form is matter.

The word 'desires' is a bit misleading. Aristotle uses the medio-passive form, ὀρέγεσθαι. In this form, the verb originally meant 'to stretch oneself out', 'to reach at/to a thing' or 'to grasp at/for a thing'. Only later did it receive its metaphorical extension into the psychological domain and the meaning 'to yearn for' or 'to desire'. So for matter to desire form is for it to be that which reaches out toward or grasps for form; matter is that which is in need of completion.<sup>51</sup>

To say that nature *qua* matter reaches out toward nature *qua* form is another way of saying that a natural body moves for the sake of its own completion. This is because to be the matter of a natural body is to be *dunamei* that which the informed body is *energeiāi*. And the transition from being an F *dunamei* to being an F *energeiāi* is a preservation or salvation (σωτηρία) of what was present before: it is a 'development (ἐπίδοσις) of the thing into itself and its

51 At *Metaph.* Θ.8, 1050a15-16, Aristotle says that matter is *dunamei* 'because it may come to its form' and is *energeiāi* when 'it is in its form' (ἔτι ἢ ὕλη ἔστι δυνάμει ὅτι ἔλθοι ἂν εἰς τὸ εἶδος· ὅταν δέ γε ἐνεργείᾳ ᾗ, τότε ἐν τῷ εἶδει ἐστίν). The phrase ἔλθοι ἂν εἰς has been translated as 'come to', 'go to', 'proceed to', 'attain to' and 'enter'.

fulfillment (ἐντελέχειαν)' (*De An.* 2.5, 417b7; cf. *Metaph.* H.6, 1045b18-19). This transition covers both the generation of a substance and the form-directed movements of a natural substance that has already come to be.<sup>52</sup> When a natural body exercises its natural capacities, the resulting movements not only 'bring to actuality the proper activities that they [sc. natural bodies] potentially possess' (*Phys.* 8.4, 255a30-1). In addition, the natural body develops as the sort of thing it is. Insofar as it is appropriate to think of ends as goods, it is reasonable to describe an explanation in terms of final causation as one that says something occurs 'because it is better thus (διότι βέλτιον οὕτως) (not without qualification, but with reference to the substance in each case)' (2.7, 198b8-9; cf. *Top.* 6.8, 146b9-10). So when fire, say, moves to its proper location, it is not only exercising a capacity to be at a location. It is, by virtue of exercising this capacity, also moving 'towards its own form' (*Cael.* 4.3, 310a33-b1, 311a2 ff.); it is attaining (or more fully realizing) the good for the sake of which its motion occurs where this good simply is its form.<sup>53</sup>

So all natural bodies must possess matter if natures are to be final causes in the way that they are.<sup>54</sup> And to have matter is to have various form-directed capacities. The transition from being an F *dunamei* to being an F *energeiāi* is effected through the exercises of capacities, where these capacities include (i) capacities to change, be changed by, or resist being changed by something else or oneself *qua* other (*Metaph.* Θ.1, 1046a9-16), (ii) capacities for activities like seeing and contemplating that are complete in that they contain their own ends (Θ.6, 1048b18-34), (iii) capacities for change in oneself *qua* oneself (Θ.8, 1049b9-10) and (iv) capacities characteristic of pre-existent matter for a

52 The coming to be is slightly more complicated in that it is both a transition from unlike to unlike (e.g. fire *energeiāi* comes to be air *energeiāi*) and a transition from like to like (fire *dunamei* comes to be fire *energeiāi*) (*Cael.* 4.3, 310b1-2). Aristotle notes this duality when he discusses the coming to be of tissue from food/blood (*De An.* 2.4, 416a29-b10; cf. *Phys.* 1.9, 192a25-9, with Frey *forthcoming*).

53 This account of 'elemental teleology' is not uncontroversial. For example, Nussbaum 1978, 93-4, Wieland 1975, Gotthelf 1987 and Byrne 2002 all argue against teleological explanations for the simple bodies' movements. Some who defend elemental teleology do so because they think it is part of a more global, cosmic teleology, e.g. Rist 1965, 342 and Owens 1968, 167. Defenders of teleological explanations of the simple bodies' movements who do not appeal to (or at least do not think they need to appeal to) global teleology include Johnson 2005, 140-4, Balme 1965, 6 and Lang 1998.

54 This is not to say that all forms that are final causes must have matter. The unmoved mover is an immaterial (and non-natural) final cause. But in order for something to be a final cause in the way that natures are final causes, there must be matter.

substance (Θ.6, 1048b9-10).<sup>55</sup> And something is capable (*δυνατόν*) and is said to be capable (*δύνασθαι*) when it has a capacity (*δύναμις*) to (be an) F, and when something possesses an *unexercised* (or incompletely exercised) capacity to (be an) F it is, in that respect, (an) F in capacity (*δυνάμει*) (Δ.12, 1019a32 ff.). So a nature is a form inasmuch as it determines (or is) the *energeia* that exhausts what it is to be a natural body of a given kind and is ‘the cause of the matter’ (*Phys.* 2.9, 200a33) insofar as its bodily capacities have this form as an end and thereby both come to be and come to be exercised for the sake of this form. That is, a natural body’s form is its matter’s cause insofar as the unhindered exercise of its bodily capacities simply is the realization (or the more complete realization) of the relevant form-determined (or form-constitutive) *energeia*.

Most of the above claims about matter, form, capacities and nature, including the claim that nature is a road toward nature, concern terrestrial bodies that come to be and perish.<sup>56</sup> That for the sake of which a body comes to be by natural generation or into which a natural body develops through change and action is its nature *qua* form. But what about ungenerable and imperishable natural bodies? If a natural body’s substance is its nature *qua* form, why can’t *aither* possess a nature simply by being what it is *energeiāi*?

Aristotle suggests that if we search for what it is about an eternal body in virtue of which it can be for the sake of what it is, we will come up empty handed. He says: ‘what is in the best state [sc. god] has no need of action (*πράξεως*), since it is itself the “that for the sake of which”; but action (*πράξις*) always consists in two factors, when there is “that for the sake of which” and “what is for the sake of this” (*ὅταν καὶ οὐ ἔνεκα ἧ καὶ τὸ τούτου ἔνεκα*)’ (*Cael.* 2.12, 292b4-7). The analysis this passage offers seems to have consequences for how we are to understand what it is for *aither*’s movement to be by nature (and, in a more limited way, for how we are to understand what it is for any natural body to be in a state that constitutes the good for its kind). Given that *aither* is necessarily in the state that is best for it *qua aither*, why is there any need to appeal to ‘what is for the sake of’ this state? For in the present context, it is clear that a

55 I am not here taking a stand on the subtle similarities and differences between these four classifications, or on whether and how they overlap. In addition to the books by Makin and Beere, a nice discussion of the difficulties surrounding the relationships among these notions of *dunamis* is Anagnostopoulos 2011.

56 ἔτι δ’ ἡ φύσις ἢ λεγομένη ὡς γένεσις ὁδός ἔστιν εἰς φύσιν (*Phys.* 2.1, 193b12-13). Several passages contain the claim that matter is potentiality without explicitly mentioning generation (e.g. *De An* 2.1, 412a9; 2.2, 414a16; *Metaph.* H.2, 1042b9, and H.6, 1045a23). But many other instances of the claim clearly concern those things which come to be and pass away (e.g. *Metaph.* Z.7, 1032a16 ff.; H.1, 1042a7; Θ.8, 1050a15-16; and Λ.5, 1071a8-11).

πρᾶξις picks out a movement that completes something; it involves either transition or development. And there will never be a movement that constitutes a transition from *aither's* not being in the state that is best for it *qua aither* to being in such a state; there will never be a transition from being *aither dunamei* to being *aither energeiāi*. In fact, if *aither* were to undergo any transition or 'development' at all, it would be away from its nature and form and therefore be for the worse.

But the preceding argument for the necessary presence of capacities in terrestrial, natural bodies did not turn on their being subject to generation and corruption, but rather on what it is for a nature to be a final cause. In order for a nature to be a final cause, it must be an end and there must be some aspect of the very same natural body that is for the sake of this end, some aspect whose identity in part consists in its having the natural body's form as an end. The aspect of a natural body that is for the sake of nature *qua* form, viz. matter, need not be matter for generation. But it must be cashed out in terms of capacities whose exercise constitutes the realization or perpetuation of the form that is the end for the sake of which they are present and exist as the capacities they are.

I have argued that *aither's* circular motion is both due to and is for the sake of its nature.<sup>57</sup> *Aither's* continuous circular motion is the continuous realization and perpetuation of its own formal being. As with other natural bodies, it achieves and maintains this end so long as it encounters no interference. Given that *aither* is in motion and that there is nothing in the natural order which can interfere with this motion, there will never be a need for a movement that completes or further develops *aither* as the kind of natural being it is. But it does not follow that *aither's* movement is not the exercise of a

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57 *Aither* also has an end beyond its formal nature. 'What is in the best state,' Aristotle's eternally-active god, is the 'ultimate end' and the 'most divine principle' and is an end toward which *aither* aims (but which it can never fully achieve) (292b1-22; cf. 2.1 284a17-18; 2.12, 292a22; and *MA* 6, 700b32-4). Indeed, the unqualified goodness that is god's eternal activity is, in some sense, an end of everything that is or comes to be by nature (*Metaph.* Λ.10, 1075a11-25). For not only the reproduction of plants, animals and humans, but the activity central to human *eudaimonia*, viz. theoretical contemplation (θεωρία), are said to imitate (μιμεῖται) the eternal and divine. (On reproduction, see *De An.* 2.4, 415a26-b7 and *GA* 2.1, 731b24-732a11; on *theōria*, see *EN* 10.7, 1177b27-1178a8 and 10.8, 1178b21-4.) Even the cyclical transformations of the inanimate, terrestrial, simple bodies imitate the eternal and the divine (*Metaph.* Θ.8, 1050b28-9 and *GC* 2.10, 337a1-7). But this does not prevent *aither*, or any other body that possesses a nature, from having its nature *qua* form as an end in such a way that its capacities are to be understood as existing as the capacities they are because they come to be and/or are for the sake of this nature.

capacity at all or that there is a complete breakdown in the distinction between ‘that for the sake of which’ and ‘what is for the sake of this’. For Aristotle is clear that *aither* does have a matter. It is not a matter for generation. But it still stands to *aither*’s circular movement as potentiality stands to actuality. *Aither*’s locomotive capacity is eternally and necessarily exercised. So *aither* never is what it is *dunamei*. But if *aither*’s nature is its form and end, then *aither* must possess a capacity that is, and is exercised, for the sake of this end.

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