The role of efficient causation in Aristotle's philosophy: ensuring the continuity and coherence of the cosmos within a teleological framework

Que, Y.

Chapter 2: The Limitations of Final Causation in Aristotle's Explanation of the Universe

In this chapter, I aim to investigate whether and how final causes can provide a unified explanation of the entire universe across Aristotle's corpus of natural philosophical treatises. This investigation engages with critical interpretations that challenge the explanatory scope of final causality in Aristotle's natural philosophy, particularly regarding its applicability to specific domains of the universe. Gutas[42] draws attention to Theophrastus' reservations regarding the sufficiency of final causes in accounting for first principles, arguing that Aristotle's teleological framework encounters fundamental difficulties when extended to the most basic strata of reality. As Gutas observes, Theophrastus raises the question of whether final causality operates at the level of primary substances or whether its proper domain is restricted to composite entities, whose functions and ends are more readily intelligible within a teleological schema. This critique underscores a broader philosophical concern: whether Aristotle's teleology constitutes a universally applicable mode of explanation or whether its validity is circumscribed by specific conditions. A similar challenge is presented by Frede[43], who, in his analysis of *Meta Lambda*, interrogate the extent to which teleological explanations can be coherently extended beyond the sublunary realm, particularly with respect to the Prime Mover and the celestial spheres, where causal relations appear to diverge from those operative in the domain of natural substances. By engaging with these critiques, this study will evaluate the extent to which final causality can serve as a unifying explanatory principle within Aristotle's philosophy of nature and whether its limitations necessitate a reassessment of its role within his broader metaphysical framework.

Aristotle assigns the final cause a central role as the ultimate explanatory principle within his teleological framework. He attributes an overarching teleological order to the cosmos, a theme explored extensively throughout his corpus of natural philosophical treatises. In *Meta Lambda*[44], which serves as the

[42] See Gutas (2010, 5–6).

[43] See Frede (2000, 47–49).

[44] See *Meta*, *Lambda*. 6–10.

starting point for our investigation, Aristotle presents the universe as unified by the final cause, conceiving it—exemplified by the Unmoved Mover—as a teleological principle that applies to all things in the cosmos. This unity, as Aristotle suggests, can be understood either in the sense that nature as a whole is directed towards a final cause, or by analogy, as in the way an army is unified under a general or a household is ordered towards the good of the household. One might expect consensus on so fundamental an issue. Nonetheless, there remains significant debate over whether and how the final cause functions as a unified explanatory principle across different domains of Aristotle's universe—namely, cosmology, the motion of elements, meteorology, and biology. A central point of contention concerns the apparent tension between Aristotle's assertion that the cosmos as a whole possesses a telos and the fact that certain parts of it seem to lack an intrinsic final cause. If teleology is to serve as a universal explanatory principle, should it not apply uniformly to all aspects of the natural world? Or does Aristotle's framework permit a hierarchical or differentiated teleology, wherein certain entities—such as living beings—are more explicitly directed toward ends, while others—such as inanimate elements—are only teleological in a derivative or subordinate sense? This ambiguity raises broader questions about the coherence of Aristotle's teleological system, particularly regarding the causal role of the Prime Mover and the extent to which natural substances participate in teleology by analogy rather than through direct purposiveness.

On the one hand, scholars such as Rist and Owens argue—either explicitly or implicitly—that the final cause extends to the entire universe, maintaining that teleology operates at a cosmic level rather than being confined to particular domains.[45] Kahn argues that final causal explanation is universal and can be applied to both the animate and inanimate worlds. Balme, while agreeing that final causal explanation can be applied to certain domains of the universe, such as the motion of elements, rejects the notion of an overarching, universal final causal explanation in Aristotle's philosophy.[46] On the other hand, Ayala argues that Aristotle's final causal explanation is applicable only to the animate world and

[45] Rist (1965, 343) assumes that final causal explanation applies to nature as a whole. Owens (1968, 159) holds that there is an overall final causal explanation in Aristotle's natural world.

[46] It seems that Balme holds the view that the motion of elements is explicable by final causal explanation: 'Finality, in Aristotle's view, goes through and through nature from the elements upwards' (Balme 1987b, 277). But Balme rejects a unified overall final causal explanation in nature (Balme 1972, 94), for example, in biology (Balme 1999, 34 (note at 696b27)).

cannot be used to explain non-living things.[47] Similarly, Nussbaum contends that Aristotle's final causal explanation does not apply to the motion of elements or meteorological events but is confined to the domain of biology. [48] Furthermore, other scholars[49] also maintain that final causes do not operate in the fields of meteorology or the motion of elements. It is evident, then, that the role of final causal explanation in providing a unified account of Aristotle's universe across its various domains requires further investigation.

Addressing these tensions will allow for a more precise assessment of whether Aristotle's conception of final causality can indeed function as a unified explanatory principle across the various domains of his natural philosophy. For clarity's sake, the chapter is divided into four sections. Section 2.1 explores the role of final causes in within the field of cosmology. This analysis begins with *Meta Lambda*, where Aristotle conceives of the final cause as a teleological principle applicable to everything in the universe. Section 2.2 addresses the limited role of final causal explanation in the motion of elements, considering both terrestrial and celestial motions. Section 2.3 investigates the contribution of final causes to Aristotle's explanation of the universe in the field of meteorology, seeking to answer whether final causal explanation can be applied to meteorological phenomena. Finally, Section 2.4 examines the role of final causes in the unified explanation of Aristotle's universe within the field of biology. This section focuses on the extensive use of direct final causal explanation in Aristotle's biological treatises, while also discussing specific biological cases that cannot be fully explained through final causes alone.

[47] See Ayala (1970, 48).

[48] Nussbaum (1978, 92–93) argues that final causal explanation cannot be utilized in the elemental motions nor the meteorological phenomena: 'the idea that I think natural phenomena—eclipses, rainstorms, the downward motion of earth, the upward motion of fire—are best explained teleologically, is a misconception that I frequently try to avoid'. Therefore, she rejects a universal final causal explanation in Aristotle's project.

[49] Including Wieland (1975, 150), Gotthelf (1987a, 209–210) and Byrne (2002, 18–19), etc.

2.1 The Limitation of Final Causation in Aristotle's Explanation of Cosmology

We can now investigate the contribution of Aristotle's final cause to a unified explanation across the various fields of his universe. To begin, I will examine the role of the final cause in achieving an explanatory framework within the field of cosmology. Most scholars who have studied the role of final causation in this field have assumed or defended the role of final causes in cosmology[50]; other scholars argued that in the field of cosmology final causes play a limited role[51]. For instance, Cooper contends that Aristotle's explanation of final causes is sufficient to account for all natural processes without requiring an additional external teleological principle that lies beyond these processes.[52] In this view, final causality is not something imposed from outside but is intrinsic to nature itself, structuring its processes without necessitating further ends or purposes beyond what is already present within the workings of natural phenomena. Furley rejects the view that Aristotle's final cause has a limited role to explain natural phenomena, instead, he posits an overall final causal explanation for the natural world, including the field of cosmology.[53] Kahn holds that the cosmic final cause reaching down from the outer heavens is thought to include both inanimate nature and the biological works. Matthen argues that the final cause is sufficient to explain the cosmos: 'The cosmos is so organized as to achieve an end proprietary to its own essence'.[54] On the other hand, Leunissen, rejecting such conceptions, believes that, in comparison with other physical treatises, Aristotle's general reliance on the final cause to explain the different motions and features of the heavenly bodies seems to be limited.[55] Charles even argues that the instances in the cosmology do not

[50] The effective role of final cause in the field of cosmology is assumed or defended by Cooper (1982); Furley (1985, 115–116); (2002, 75); Kahn (1985); Matthen (2001) and (2009); and Wardy (1993, 19).

[51] The limits of the role of Aristotle's final cause in the field of cosmology are emphasized by Leunissen (2010b) and Charles (2012, 23–26).

[52] Cooper (1982).

[53] See Furley (1985, 115–116) and Furley (2002, 75).

[54] See Matthen (2001, 192).

[55] Leunissen (2010b, 216–217).

meet Aristotle's own conditions for a final cause.[56] Clearly, then, the status of the explanation of Aristotle's final cause in the field of cosmology needs sorting out.

In this section, I undertake to investigate how Aristotle's final cause contributes to a unified explanation of the universe. I begin my analysis with *Meta Lambda*, where Aristotle presents the final cause as a teleological account applicable to everything in the universe. Following Aristotle's line of reasoning, I start my investigation at the end of *Lambda* 5, which directly addresses Aristotle's exploration of the final cause. Here, I analyze Aristotle's treatment of the relationship between different causes and argue why some causes can be applied universally while others cannot. I then turn to *Lambda* 6–10 and other related treatises to examine whether and how Aristotle's final cause, epitomized by the Unmoved Mover, functions as an explanatory principle for the entire universe.

2.1.1 Final Causation in *Metaphysics Lambda:* The Unmoved Mover Governs the Universe as a Final Cause

The *Meta Lambda* lays the foundation for the role of the final cause in Aristotle's cosmological framework.[57] In this treatise, Aristotle presents the primary Unmoved Mover as a final cause, at the same time providing an explanation through which everything in the universe is interconnected. Thus, *Meta Lambda* serves as the starting point for my investigation into the role of the final cause in achieving a teleological explanation of the universe as a whole.[58]

To clarify the role of the final cause in Aristotle's cosmology, it is essential to

[56] Charles (2012, 23–26).

[57] Scholars who have studied the role of Aristotle's final cause in the field of cosmology have focused mainly on the role of the Unmoved Mover as final cause in Aristotle's *Meta*. See Kahn (1985); Horn (2016); Matthen (2001, 190–192); Charles (2012, 23–24); Ross, A (2016), Johnson (2005, 253–258) and Bodnar (2016).

[58] To be sure, the Unmoved Mover (first mover) is also discussed in *Phys* VIII. Aristotle's discussion on the Unmoved Mover in *Meta* XII is closely related to *Phys* VIII. (Many scholars have been aware of the correspondence between these two books, e.g., Berti (2000, 185–189); Johnson (2005, 254–255); Ross (1997, 342–349). In my mind, Aristotle in *Meta* XII discusses the primary Unmoved Mover in terms of final cause; while in *Phys* VIII he investigates the primary Unmoved Mover in the sense of efficient cause. For the role of the first mover as efficient cause in *Phys* VIII, see chapter 3.1.

examine how Aristotle develops this claim. Before delving into his arguments in detail, I will first outline key lines of discussion. Aristotle begins *Meta Lambda* with an exploration of certain established principles regarding the nature of substances and their changes (*Meta* XII.1–5). He then proceeds to identify the ultimate causes of all motion in the natural world (*Meta* XII.6), culminating in the introduction of a primary Unmoved Mover on which depend all moving causes. Subsequently, Aristotle investigates how an Unmoved Mover causes motion (*Meta* XII.7), the actual number of Unmoved Movers (*Meta* XII.8), and the specific mode of causation attributed to the Unmoved Mover (*Meta* XII.9). Ultimately, Aristotle concludes that the primary Unmoved Mover must function as a final cause. Finally, in *Meta* XII.10, he integrates these findings by positing a final cause that governs the cosmos.

The discussions directly relevant to examining the role of the final cause in achieving a unified explanation begin in *Meta* XII.4 and XII.5[59], where Aristotle claims that the causes and principles of different things, although differing with respect to the specific substance, are by analogy one and the same (*Meta* XII.4, 1070a32–33)[60]. Although Aristotle acknowledges that causes differ for different things, as they are understood relative to distinct kinds of perception, he maintains that all things share the same causes by analogy (*Meta* XII.4, 1070b9–20). He illustrates this principle using the example of elements to demonstrate how the same causes can apply universally across diverse phenomena[61] (*Meta* XII.4, 1070b21–30). Aristotle explains that while things in the universe share the same elements and principles, specifically different things possess specifically different elements. However, we cannot assert that all things have identical elements in a literal sense, but rather only by analogy. For example, principles such as form, privation, and matter differ across various classes of things. In the case of color, the principles are white, black, and surface; similarly, for phenomena like day and night, the principles are light, darkness, and air. Furthermore, Aristotle clarifies that causes are not limited to inherent properties within an object but also include external factors, such as the moving cause. Thus, the terms “principle” and

[59] *Meta* XII.4 and XII.5 are closely linked together: they form a distinct whole, in which Aristotle argues that the causes of different things are by analogy one and the same. See Crubellier (2000, 137).

[60] Sedley (2000, 327) considers this thought as one of the key points to the research of *Metaphysics*.

[61] For a discussion of the example of elements, see Crubeller (2000, 156–160).

"element", while closely related, are not synonymous, though both function as causes. Aristotle concludes by noting that the causes, which are analogous across different cases, can also be expressed in a universal formula (*Meta* XII.5, 1071a20–30). The causes of things belonging to different classes—such as colors, sounds, substances, and quantities—differ except in an analogical sense. Even within the same species, causes differ; for instance, the matter, form, and moving cause of one individual are distinct from those of another. However, Aristotle argues that these causes are identical in their universal formula. He integrates the causes of form, matter, mover, and end, asserting that in the sense of analogy, these causes are one and the same.

For example, while different things have distinct final causes, all final causes are, by analogy, one and the same. Aristotle extends this principle to substances, contending that the causes of substances can be regarded as causes of all things, insofar as removing these causes results in the cessation of everything (*Meta* XII.5, 1071b6–9). By treating the universe as a whole, Aristotle elevates the extent to which all things can be said to share the same cause to the highest level of generality. The analogical identification of causes in the universe arises from the fact that universal causes are, in essence, one and the same. According to Aristotle, the universe itself possesses its own matter, form, mover, and end. The matter of the universe is the elements; its form is the spherical structure, divided according to the natural place of the elements; and its mover is the primary Unmoved Mover.[62]

In XII.6, Aristotle demonstrates the eternity of motion and examines the relationship between potentiality and actuality in motion. Based on this analysis, he posits the existence of an unmoved substance[63] (*Meta* XII.6, 1071b11–22). If there is eternal motion, such as the movement of the heavenly bodies, and if its potentiality admits the possibility of not acting, the cause of this motion must be pure actuality. The reason is that if the cause were potential, even partially or under certain aspects, it would entail the possibility of not acting—such as not moving. In this case, the eternal motion of the heavenly bodies would not exist, since that which is potential may also fail to be. Consequently, there must exist a principle whose very substance is pure actuality. Furthermore, the actuality of this unmoved

[62] For the matter, form and the mover of the universe, see Matthen (2001, 189–197).

[63] For the reason why this substance is unmoved, see *Phys* VIII.4–5, which I will discuss in Chapter 3.2.1. For the discussion of the connection of Aristotle's *Phys* and *Meta*, see chapter 3.2.3.

substance is not merely the actuality of immobility but also the actuality of a moving cause. Aristotle critiques his predecessors, including Plato and Leucippus, for their limited discussions on this topic (*Meta* XII.6, 1072a4–6). For instance, while Plato and Leucippus assert the eternal existence of motion, they fail to explain why motion exists or what causes it. They do not identify the principle responsible for the universe's motion, whether in one way or another. Thus, in *Meta* XII.6, Aristotle establishes the existence of an unmoved substance, which is pure actuality, grounded in the concept of eternity of motion and his theory of potentiality and actuality. These ideas are further developed in XII.7[64], where Aristotle investigates the characteristics of the Unmoved Mover and its relationship to that which it moves. [65] Indeed, the most explicit evidence supporting the Unmoved Mover as a final cause appears in the renowned passage of XII.7. Specifically, after positing the existence of a mover that moves the universe without itself being moved, Aristotle states:

> And the object of desire and the object of thought move in this way; they move without being moved.
>
> *Meta* XII.7, 1072a25–27 (trans. W. D. Ross)

In this argument, Aristotle addresses how an Unmoved Mover can cause motion, proposing that it moves in the same manner as the object of desire or the object of thought, which cause motion without themselves being moved. This ability to cause motion without being moved is the defining characteristic of the Unmoved Mover. To illustrate this principle, Aristotle introduces the examples of desire and thought: both cause motion without undergoing change themselves. These ideas are closely linked to Aristotle's doctrines of desire and thought as causes of motion, discussed in *DA* and *Motu*[66]. In these treatises, Aristotle frequently emphasizes cases of motion initiated without reciprocal movement. For instance, the object of

[64] XII. 7 does not constitute a self-contained unit, but is the continuation of a discussion begun in XII.6.

[65] Some interpreters comment on the object of desire and the object of thought in 1072a26–b1 as the primary Unmoved Mover; see, for instance, Laks (2000, 221–223) and Jaeger (1962, 112). But I prefer a less far-reaching interpretation of these sentences: the primary Unmoved Mover moves in the same way in which the object of desire and thought move without being moved, since Aristotle does not explicitly say here that the object of desire or the object of thought is the primary Unmoved Mover.

[66] See e.g., *DA* III.10, 433b10–14; *Motu* VI, 700b15–701a5.

desire moves without being moved by being imagined or thought of (*DA* III.10, 433b13). Expanding on this, in *Meta* XII.7, Aristotle explicitly cited above that the Unmoved Mover "produces motion without being moved" (1072a25). He further clarifies this mode of causation by describing the Unmoved Mover as moving "as if it were beloved", analogous to how loved things inspire motion without themselves being moved. This mode of causation provides a universal explanation for the continuity of motion throughout the cosmos. Aristotle then identifies a specific aspect of the final cause: "That a final cause (that for the sake of which) exists among unmovable entities is shown by the distinction of its meanings; for the final cause is some being for whose good the action is done, and something at which the action aims; and of these the latter exists among unmovable entities though the former does not"[67] (*Meta* XII.7, 1072b1–3). Here, Aristotle explicitly presents the Unmoved Mover as a final cause, describing its existence as 'for the sake of which', thereby indicating its role as the ultimate aim or purpose (telos) of all motion rather than as a beneficiary. This distinction is crucial, as the Unmoved Mover does not receive or gain from the motion it actualizes, but rather functions as the end toward which all motion is directed.

More importantly, Aristotle then devotes his attention to the necessity of the primary Unmoved Mover (*Meta* XII.7, 1072b4–13). The motion of the first heaven is posited here by way of contrast with the primary Unmoved Mover. Its actuality consists in being the primary motion; and insofar as it is in motion, it is capable of being otherwise with respect to place, even if not with respect to substance (*Meta* IX.8, 1050b6–1051a3; *Phys* V.1, 224a19–224b7). While the primary Unmoved Mover is something which imparts movement while itself being unmoved being in a state of actuality, it can in no way be otherwise than it is. The motion inspired by the primary Unmoved Mover produces the motion of the first heaven as well as other heavenly bodies. Further, Aristotle identifies locomotion[68] as the primary and most fundamental kind of change, and the circular motion of the heavenly bodies as the first and most perfect form of locomotion (*Phys* VIII.7, 260a26–b7; *DC* II.6, 288a28–b5). The primary Unmoved Mover (first mover) then exists of necessity, and insofar as it is

[67] For the detailed discussion of the two senses of 'for the sake of which' in Aristotle, see chapter 1.2.1.

[68] According to Aristotle, 'motion' (κίνησις) is a broader term than 'locomotion' (ἡ κατὰ τόπον κίνησις).

necessary, it is good, and in this sense the first mover is the 'first principle'. For what is necessary has all these senses—that which is necessary perforce because it is contrary to impulse, that without which the good is impossible, and that which cannot be otherwise but is absolutely necessary (*Meta* XII.7, 1072b12–14). Accordingly, Aristotle says that heaven and the world of nature depend on the Unmoved Mover (first principle) (*Meta* XII.7, 1072b15f). As a result, there is no doubt that heaven and the world of nature depend on the first mover, which is conceived as a final cause. In this sense, the final cause, epitomized by the first mover, can ensure a unified explanation, not only in the cosmos, but in the whole world of nature.

Meta XII.8[69] provides some additional evidence in favor of the Unmoved Mover as the final cause of the universe[70]. Here Aristotle attempts to specify the number of unmoved substances (Unmoved Movers), and discusses the number of Unmoved Movers that are necessary to move not only the first heaven, but also the other celestial bodies.[71] Aristotle proposes two different numbers for the celestial spheres—and consequently for the Unmoved Movers—namely, 47 and 55 (*Meta* XII.8, 1074a12–30). He then argues against the possibility of additional Unmoved Movers, reasoning that if a movement exists for the sake of another movement, then the latter must also exist for something else. Since an infinite regress of such movements is impossible, every movement must ultimately be directed toward one of the divine bodies that move through the heavens. Consequently, Aristotle concludes that there is but one primary Unmoved Mover.

Next, we turn to the doctrine that the Unmoved Mover, which unifies the universe as a final cause, is conceived of as divine thought (*Meta* XII.8, 1074a7–10). This characteristic of the Unmoved Mover follows from the discussion of *Meta* XII.6 and XII.7. In XII.6, Aristotle shows an Unmoved Mover whose substance is actuality (*Meta* XII.6, 1071b20–21) and by which all things are moved in the same way as 'thought is moved by the object of thought' (*Meta* XII.7,

[69] Some commentators have followed W. D. Ross (1997, 348) in believing that *Meta* XII.8 is a misplaced fragment which is much later than the rest of the treatise, and should be placed at the end of this book (*Meta* XII). E.g., Jaeger (1965, 342) and Devereux (1987, 168).

[70] Berti (2000, 204) comments that the evidence in *Meta* XII.8 is very weak to support the Unmoved Mover as the final cause of the universe. But I prefer to argue that XII.8 provides some evidence additional to the other passages in *Meta* XII.

[71] For a discussion of the relation between *Meta* XII.8 and Aristotle's other treatises on astronomy, see Lloyd (2000, 245–252).

1072a30). This Unmoved Mover is therefore the principle ‘on which depend the heaven the world of nature’ (*Meta* XII.7, 1072b13). Thus, the Unmoved Mover unifies the universe as a final cause. Aristotle then sets out to give us an idea of the mode of existence of the Unmoved Mover: ‘its life is such as the best which we enjoy, and enjoy for but a short time, for it is ever in this state (which we cannot be), since its actuality is also pleasure’ (*Meta* XII.7, 1072b14–17). This characterization of the Unmoved Mover as a final cause unifying the cosmos is not merely a metaphysical postulate. Rather, Aristotle further elucidates its causal efficacy in the natural world by showing how the Unmoved Mover produces motion in the first heaven. While itself remaining in pure actuality and immobility, the Unmoved Mover inspires the eternal circular motion of the heavenly bodies, beginning with the first heaven. This connection between the supreme actuality of the Unmoved Mover and the first and most perfect type of change — locomotion — is central to Aristotle's cosmology. After presenting these significant points, Aristotle continues to argue the characteristics of the first mover and indicates that the actuality of the first mover is also pleasure, and that since it is pleasure, it is also thinking, and since it is thinking it is also life, the highest good and eternal life, namely, god (*Meta* XII.7, 1072b17–30). And it seems that both the whole universe and also the nature of the world depend on the first mover, whose life is always such as the best which we enjoy, since its actuality is also pleasure. Thus, waking, perception and thinking are the most pleasant, and hope and memory are the most pleasant since they relate to them.

Aristotle employs the pleasure of the actuality to explain the pleasure we take in cognitive awareness: therefore waking, perception and thinking are most pleasant, and hopes and memories are so as a result of their reference to these. But it is thinking itself which is clearly the primary mode of such awareness, and which both possessing and being determined by its object. Thinking thinks itself since it shares the nature of the object of thought, and it becomes the object of thought in the process of coming into contact with and thinking its objects, thus thought and the object of thought are the same (*Meta* XII.7, 1072b19–23). For that which is capable of receiving the object of thought—namely, substance—is the faculty of thought. This faculty becomes active when it possesses its object. Therefore, it is the possession of the object, rather than the faculty of thought itself, that constitutes the divine element which thought appears to contain. Moreover, active thinking is both the most pleasant and the highest form of thought. After

the identification of thought as the divine thing which can think itself, in *Meta* XII.[72], Aristotle officially devotes himself to the discussion of 'some difficulties'[73] concerning the questions about divine thought.[74] Accordingly, the famous doctrine of XII.9 with respect to which the Unmoved Mover thinks itself, provides the necessary condition to admit that it also loves itself and moves for the pleasure of moving, having as its end as only itself[75].

Once Aristotle has ascertained that the Unmoved Mover unifies the universe as a final cause, which is pure actuality, being the best and the intellect (divine thought), he connects these arguments by focusing, no longer directly on the Unmoved Mover unifying the universe as a final cause, but on an overall final causal explanation of the universe in *Meta* XII.10[76]. The key question that emerges is how this order operates: is it a hierarchical structure in which all beings are oriented toward the Prime Mover by degrees of participation, or is it an intrinsic teleological organization where each entity realizes its own actuality in relation to the whole? By exploring this transition, Aristotle provides an overarching final causal explanation of the universe. Although no direct discussion of the Unmoved Mover is to be found in this text, the whole argument still concerns a unifying final cause for the whole universe[77]. In the key texts on the unifying final cause of the whole, at the opening of *Meta* XII.10, as Aristotle describes, the universe is

[72] *Meta* XII.9 seems to be a sort of appendix to XII.7, separated from it by the appendix on astronomy in XII.8. For the comparison between *Meta* XII.7 and XII.9, see Brunschwig (2000, 301–306).

[73] For the discussion of these difficulties, see Kosman (2000, 312–325).

[74] Ross (1997, 349) notes that because of the number of these difficulties, the structure of the chapter is often described as fairly disorderly.

[75] The 'difficulties' which Aristotle has discussed in *Meta* XII.9 cannot threaten the orderly arrangement of the universe which is guaranteed by the Unmoved Mover, so I will not discuss these difficulties in detail.

[76] According to the interpretations of Matthen (2001, 195–196) and Sedley (2000, 327–328), Metaphysics XII.10 remains primarily concerned with the characterization of the Unmoved Mover. Matthen argues that the passages in Metaphysics XII.10, where the Prime Mover is described as the source of the good in the universe, present an analogy to a general who imposes order within his army. Sedley, in contrast, maintains that the Unmoved Mover functions as the ultimate cause, directly or indirectly inspiring all beings to actualize their highest potential. Notably, although Aristotle does not explicitly employ the term 'final cause' throughout this passage, references to 'the good' and 'the best' are pervasive, suggesting an implicit teleological dimension.

[77] It should be noted that this passage is not straightforwardly the explanation of final cause at all, but in view of Aristotle's discussion in this passage and its relation to other passages of *Meta* XII, I prefer to follow the interpretation that this passage is about the unifying final cause. For the interpretations of the explanation of the universe based on final causal explanation in *Meta* XII.10, see Horn (2016, 280–286); Charles (2012, 23–26); Johnson (2005, 271–274); Mattern (2001, 192–196); Sedley (2000, 327–336) and Furley (2002, 74–76).

well unified and organized in terms of the good. Aristotle refers to 'the nature of the whole' and continues by presenting a hierarchical 'joint arrangement'[78] of the whole universe. Aristotle employs the analogy of an army to illustrate how the universe is unified (*Meta* XII.10, 1075a11–16). Just as an army derives its order and purpose from the leadership of a general, so too is the universe structured in a way that its unity depends on a primary governing principle. In this analogy, the good of the army is realized both in the general and the soldiers, yet it ultimately depends on the general, whose leadership imparts direction and purpose to the whole. Aristotle goes on to analyze how everything in the universe is jointly arranged in relation to one thing. A good example brought forward by Aristotle concerns the analogy with a 'household'. According to Aristotle's argument, the universe as a whole is similar to a 'household' with respect to the fact that, although different things are arranged in different ways, all things in a 'household' are arranged to one end. For instance, the freemen in a 'household' are arranged with the least freedom to do what they wish, while slaves and beasts in a 'household' are arranged with no freedom and little common responsibility and act for the most part at random, but all of them are ordered together to one end (*Meta* XII.10, 1075a18–25).

Aristotle's discussion here shows an 'overall' explanation of the final cause of the universe, as offering a reasonable account in the sense of final causal explanation which makes the relevant instances in the universe intelligible, not to establish that final causes actually do their work in reality. The analogies of the army and the household express his view that although all things in the universe are not ordered in the same way, they are connected with each other and ordered together into one thing. He uses these two examples to help to explain how all things in the universe are jointly arranged in relation to 'one thing', which seems to be the unifying final cause. His discussion in *Meta* XII.4–5 resembles that in *Meta* XII.10 in several ways. Aristotle claims that the causes and principles of different things, although differing with respect to the specific substance, are by analogy one and with respect to the same for all (*Meta* XII.4, 1070a32–33). It can be seen that the principles for different things are 'one' in the sense of analogy. I

[78] For the passages of *Meta* XII.10, I have followed Sedley's translation (2000, 328–329), with several modifications. Notably, Sedley translates ἀμφοτέρως as 'joint arrangement,' a rendering that captures the reciprocal or dual nature implied in the original Greek. However, I have adjusted certain terms to better align with my interpretation of Aristotle's argument.

think this helps us to understand his arguments in XII.10. Considering that the causes and principles of different things are by analogy one and the same and that this implies the existence of a universal final cause in the universe[79], it seems that the argument of 'all things in the universe are ordered together to one thing' applies also in relation the final cause.

According to the discussion based on Aristotle's *Meta Lambda*, it seems fair to conclude that (1) there exists an overall influence of the final cause in the universe, and (2) the Unmoved Mover, which is pure actuality and is conceived as divine thought, imparts movement without being moved and unifies the universe as a final cause. Thus, the final cause, epitomized by the Unmoved Mover, can ensure a unified explanation of the whole universe.

2.1.2 The Limitation of Final Causation in *De Caelo*

Scholars who have studied the role of Aristotle's final cause in the field of cosmology have concentrated almost entirely on the role of the Unmoved Mover as a final cause in Aristotle's *Metaphysics*.[80] However, the role of the final cause in *De Caelo*, the treatise on cosmology in which Aristotle focuses on investigating the motions and characteristics of heavenly bodies, has received relatively little attention in the scholarly literature on Aristotle.[81] Aristotle, however, emphatically

[79] See the discussion of *Meta* XII.4–5 in chapter 2.2.1.

[80] See Kahn (1985); Horn (2016); Matthen (2001, 190–192); Charles (2012, 23–24); Ross, A (2016), Johnson (2005, 253–258) and Bodnar (2016).

[81] See, in particular, Leunissen (2010b). Leunissen has specifically explored final causal explanations that stand on their own and account for the absence of heavenly features—such as eternal circular motion or imperishability—in cosmological phenomena of the sublunary world discussed in *De Caelo (DC)*, concluding that explanations based on final causality appear more limited in comparison to those found in Aristotle's other physical treatises. Furthermore, she objects to Leggatt's view that Aristotle deliberately sought to exclude final causal explanations at certain levels of his cosmological framework. Leggatt, in his commentary on *DC*, argues that Aristotle downplays the role of the final cause in this treatise because of his dissatisfaction with Plato's teleological explanations in the *Timaeus* (see Leggatt 1995, 36–37). Consequently, Leggatt devotes little analysis to Aristotle's use of final causality in *DC*. Bolton (2010, 68) has examined certain cosmological phenomena through the lens of final causality, particularly in his discussion of the two standards for inquiry in *DC*. Charles (2012, 23–26) likewise investigates Aristotle's use of final causal explanations in *DC*, arguing that such explanations render the heavens and their movements more intelligible—appearing 'non-paradoxical' or 'reasonable' to us—precisely because they do not rely on secure teleological causes of which we have direct knowledge.

posits his study of the heavenly bodies as part of his study of nature[82]. Since he shows how the study of nature involves the theory of the four causes[83], final causal explanation should apply also in the field of cosmology. Thus, in this part, I will examine specific cases of cosmological phenomena, and discuss in how far the final cause plays a role in this field.

In *DC*, Aristotle provides several examples[84] of final causal explanations of cosmological phenomena, which are articulated through the notion of the final cause—expressed in terms such as 'for the sake of which,' 'nature does nothing in vain,' and 'end.' The first type of final causal explanation, understood in the sense of 'for the sake of which' as referring to purpose rather than beneficiary, can be identified in three cosmological phenomena: why there is more than one motion (*DC* II.3, 286a7–10); why the heavens move in the direction they do (*DC* II.5, 288a1–12); and why the heavenly bodies move with different complexities (*DC* II.12, 292a15–25). In these cases, Aristotle's teleological framework explains cosmic motions not in terms of an external beneficiary but in terms of the intrinsic purposiveness of natural processes themselves. The second kind of final causal explanation, which is in the sense of 'nature does nothing in vain', can be found in four different examples in *DC*; that is, to explain why there is no motion contrary to motion in a circle (*DC* I.4, 271a20–35); why heavenly bodies have no organs for moving (*DC* II.8, 290a29–35); why the heavenly bodies do not move on their own (*DC* II.9, 291a23–25); why the absence of the harmony of the spheres shows that the heavenly bodies do not move on their own (*DC* II.11, 291b10–15). These examples indicate that celestial bodies move according to an intrinsic purpose rather than arbitrarily. Besides these examples, there are also final causal explanations of cosmological cases in the sense of 'end'. For instance, Aristotle argues that it is best for the heavenly bodies to attain their real end, identifying this real end as a final cause governing their motion and order (*DC* II.12, 292b21–23)[85]. In this context, Aristotle maintains that celestial motions are not purely

[82] See e.g., *DC* I.1, 268a1–3; III.1, 298b1–4; *Meteor* I.1, 338a20–25.

[83] For instance, *Phys* II.2, 194a 9–18; II.3, 194b15–25; *Post* II.11, 940a20–28; Falcon (2005, 14–16).

[84] For the examples of precise causal explanation of cosmological phenomena in *DC*, I follow Leunissen's study. For detailed discussions of these seven instances of final causal explanation, see Leunissen (2010a, 152–174). As Leunissen has discussed these cases very explicitly, I will not focus on investigating these instances in detail. In the following I shall add one instance of final causal explanations of cosmological phenomena in *DC* in the sense of 'end', i.e., *DC* II.12, 292b21–23.

[85] Here Aristotle shows that, while it is obviously best for any being to attain its real end; if it cannot

mechanistic but are instead oriented toward the best possible state.

Although Aristotle does employ final causes to explain certain cosmological phenomena, these explanations constitute only a small proportion of the broader discussion in *DC*. As Leunissen has argued, while teleological explanations play a role in Aristotle's cosmology, his account of celestial movements relies predominantly on necessity and the eternal nature of the heavens. The following discussion will further examine the extent to which final causation is integrated into Aristotle's cosmological framework, particularly in relation to Leunissen's analysis. Moreover, Aristotle's investigations of cosmological phenomena are primarily based on mathematical principles and numerological doctrines, focusing on the number, shape, and possible motions of heavenly bodies (*DC* III.7). In fact, Aristotle explicitly objects to approaches that attempt to force perceptual phenomena into alignment with preconceived theories and opinions (*DC* II.13, 293a10–25); rather, he insists that additional theories should accommodate the evidence provided by perceptual phenomena. For instance, for the question of whether the Earth moves or is at rest, Aristotle responds in detail to the perceptual data of the natural notion of earth and motions of the fixed stars in relation to the Earth, and then he comes to the conclusion that the relevant perceptual phenomena testify to the fact that the Earth is the center of the whole universe (*DC* II.14, 296a24–b25). With regard to the shape of the Earth Aristotle argues on the basis of perceptual phenomena and infers that the Earth must be spherical (*DC* II.14, 297b20–25)[86]. Furthermore, Aristotle invariably uses mathematical principles to help to explain cosmological phenomena. For example, Aristotle uses calculations of the mathematicians[87] to prove the small size of the Earth, as well as the relative motions and positions of heavenly bodies.[88] It is clear by now that Aristotle aims to establish his investigations of the cosmological phenomena on perceptual data and mathematical principles, which are not explained by the final cause.

---

be, then the nearer it is to the best the better will be its state. Because they do not reach the final end, they get as close to it as their share in the divine principle allows.

[86]Besides the examples I have already discussed, there are also many arguments in *DC* to explain the cosmological phenomena based on perceptual phenomena and mathematical principles (e.g., the relatively small size of the Earth as compared to other fixed stars (*DC* II.14, 297b30–35), that Mars is further away from the Earth than the Moon (*DC* II.12, 292a21–30)) Since these are not central to the present discussion, I shall not further go into these examples here.

[87] 'Also, those mathematicians who try to calculate the size of the earth's circumference arrive at the figure 400,000 stades (about 10,000 miles). (*DC* II.14, 298a21–22)

[88] See *DC* II.14, 297a1–298a22.

Therefore, it might be asked why there are still cosmological phenomena, for which Aristotle seeks teleological explanations. Aristotle suggests that because of the long distance[89] it is difficult to offer explanations of the celestial world that are based on the perceptual phenomena:

> Since circular motion is not the contrary of the reverse circular motion, we must consider why there is more than one motion, though we have to pursue our inquiries at a distance—a distance created not so much by our spatial position as by the fact that our senses enable us to perceive very few of the attributes of the heavenly bodies.
>
> *DC* II.3, 286a5–7 (trans. J. L. Stocks)

This significant passage tells us that investigations of cosmological phenomena, which are based on the perceptual data, may encounter many difficulties because of the long distance between us and the celestial world. This long-distance perception is considered to be the main source of the difficulties. According to Aristotle, as a result of the long distance, we seem to be incapable of receiving enough empirical evidence from observation to come to an explanation. In other words, no matter how careful and hardworking we are in gathering empirical data from the celestial world, we can only ever have limited perception of its features. Regarding the difficulty of long distance in the investigation of the celestial world, Aristotle posits his solution that we can employ final causal explanation[90], since we can use final causal explanation to make the heavens and their motions seem 'reasonable'[91] to us. For instance, Aristotle believed that if one assumed that nature always followed the best course, then the associated difficulties would be resolved, and we will be given something that can be used as a reason for seeking, even if we do not prove that it is true (*DC* II.5, 288a1ff). Similarly, the most plausible view, Aristotle argued, is that stars are spherical, provided that 'nothing is in vain in nature.' (*DC* II.11, 291b12ff) In both cases, adopting a teleological perspective allows us to propose plausible explanations for phenomena for which

[89] For the difficulty of long distance in Aristotle's investigation of the celestial world, see Falcon (2005, 86–87); Leunissen (2010b, 222).

[90] 'But let not that deter us. The reason must be sought in the following facts. Everything which has a function exists for its function'. (*DC* II.3, 286a7–8)

[91] For the qualification 'reasonable' in *De caelo*, see e.g., II.5, 288a1ff; II.6 288a28ff; II.11, 291b12ff. See also Charles (2012, 23); Burnyeat (2004, 14).

we cannot prove relevant explanations (*DC* II.6, 288a28ff). As I have discussed before, Aristotle sometimes utilizes final causal explanation to explain cosmological phenomena in the sense of 'for the sake of which', 'nature does nothing in vain' and 'end'. As a scientist, Aristotle aims at establishing his investigations of the celestial world on the perceptual data and mathematical principles, thus providing a scientific explanation which is based on empirical evidence. For those cosmological phenomena on which we have insufficient perceptual data, Aristotle refers to for an explanation to the final cause.

Accordingly, my contention is that the role of Aristotle's final cause in the scientifically challenging field of cosmology is limited. In this field, Aristotle's ambition is to employ explanations based on perceptual evidence; for phenomena with limited empirical evidence, however, Aristotle relies on final causal explanation.

2.2 The Limitation of Final Causation in Aristotle's Explanation of Elements

Having examined the comparatively limited role of the final cause in Aristotle's explanations in the field of cosmology, I will now turn to investigate its role in the domain of the motion of elements.

For Aristotle, the motion of elements is part of the science of nature (*DC* I.2, 268b14–269a2) and Aristotle's science of nature involves the knowledge of all four causes[92], so the final causal explanation is likely to apply to the motion of elements as well. Considering, however, that where the motion of elements is concerned Aristotle has never referred directly to final causes, modern commentators have debated whether final causes actually play a role in this field.[93]

[92] See e.g., *Phys* II.2, 194a 9–18; II.3, 194b15–25; *Post* II.11, 940a20–28; Falcon (2005, 14–16).

[93] Commentators' viewpoints are divided on this issue. On the one hand, Rist (1965, 339) and Owens (1968, 165) believe that the motion of elements is the key point in Aristotle's final causal explanations. Balme (1965, 8) holds that Aristotle has applied the explanation of final cause in the field of the motion of elements. Johnson (2005, 131–145) has subsumed it under the normal use of Aristotle's final cause. Lang (1998, 276) considers the role of final cause in the motion of elements to be the essence of his final causal explanations. On the other hand, Nussbaum (1978, 60) comments

If final causes are not operative in the motion of elements, their overall function seems to be at stake. Therefore, the status of final causal explanation in the motion of elements needs sorting out.

Considering that the commentators who agree that Aristotle's final cause can be applied to the motion of elements conceive of the orientation of each element toward its determinate place as an explanation in terms of final cause, it is necessary to examine in what sense this interpretation is justified[94]. The purpose of this section is to clarify the role of the final cause in Aristotle's motion of the elements. The investigation of this section will be divided into two parts: the limits of the role of the final cause in the motion of sublunary elements and the limits of the role of final cause in the motion of celestial element.

2.2.1 The Limitation of Final Causation in Aristotle's Explanation of Sublunary Elements

For Aristotle, the study of the motion of elements is part of the investigation of nature. He posits that the science of nature is concerned with bodies and their magnitudes, affections and motions. As regards bodies, there exist both simple bodies and compound ones, and simple bodies are elements. Aristotle announces five elements in the universe: the celestial element (aether) which naturally has circular motion; and the sublunary elements (earth, water, air and fire) which naturally have rectilinear motion (*DC* I.2, 268b14–269a9).

Considering that the sphere and the motion of the four sublunary elements is different from the motion of the celestial element, we need to discuss them separately. In this part, I will concentrate on examining the role of the final cause in the motion of the four sublunary elements and investigating whether and how

---

that Aristotle neither [? never?] applies final cause to the nonliving natural bodies. Wieland (1975, 150), Gotthelf (1987a, 210–212), Byrne (2002, 19–20) and Charles (2012, 20–23) reject that Aristotle's final cause can be applied to the motion of elements since elements do not have ends.

[94] See e.g., Lang (1998, 271–275); Bodnár and Pellegrin (2006, 280–282); Leunissen (2010b, 215); Scharle (2005, 122); Gill (2010, 157); Matthen (2001, 181–184; 2010, 133–136). Leunissen and Gill mention this point without discussion. Matthen examines the explanation of final cause in the motion of element earth in the sense of a natural place as the end. Bodnár and Pellegrin have discussed the final causal explanation in the four sublunary elements, which would naturally move to their natural place. Although I do not accept Lang's conception of Aristotelian place, I agree with her that the determinate places of the elements are final causes.

it fits in with the idea of a teleological orientation of the universe as a whole.

Unfortunately, Aristotle's general reliance on final causes to explain the different motions and features of the sublunary elements seems to be limited. For Aristotle's theory of the four sublunary elements contain only limited utilization of final causal explanation. Moreover, Aristotle does not explicitly invoke final causes in his explanations of the motion of the four sublunary elements. However, certain explanations imply a teleological framework by presupposing a relevant notion of final causation. This is particularly evident in Aristotle's account of how each element moves toward its determinate place[95]. In this sense, the motion of the elements can be understood as goal-directed: fire, for instance, moves upward not arbitrarily, but because its proper place is at the outermost boundary of the sublunary sphere. The final cause, as Aristotle conceives it, is not merely an external goal but the actualization of the element's nature—its inherent tendency to realize its proper state. Thus, the movement of each element can be seen as occurring for the sake of[96] reaching its determinate place, where it attains its full actuality. Considering that *Phys* VIII.4 and *DC* IV.3 provide Aristotle's main account of elemental natural tendency, it is necessary to investigate these two texts.

Before discussing the elemental natural tendency in these two texts, we should first examine the different kinds of heaviness and lightness of the four sublunary elements which are closely related with their natural tendencies. In *DC*, Aristotle identifies the 'heavy' and 'light' in terms of something's natural tendency. If a body is heavy, it means that it has the natural tendency to move to the center of the universe, while saying that a body is light means that it has a natural tendency to move away from the center of the universe. In Aristotle's thought, the universe has a center and an extremity, so it must have an up and down: the extremity of the universe is up; the center of the universe is down. If a body is absolutely light, it means that this body moves upward or to the extremity of the universe. And if a body is absolutely heavy, it means that this body moves downward or to the center of the universe (*DC* IV.1, 308a22–38). According to Aristotle, the 'heaviness' and 'lightness' of elements determines their natural tendency. Earth is

[95] In my view, the determinate places of the sublunary elements are considered to be the final end or purpose of their elemental natural tendency. Scholars often refer to the 'natural places' of the elements. But Morison (2002, 33) has indicated that Aristotle nowhere speaks of 'natural' places of elements. Therefore, I prefer to express the places of elements to be their determinate places.

[96] For the relevant notions of final cause, see chapter 1.2.1.

absolutely heavy, and it cannot have any lightness, so it sinks to the bottom of all things and moves towards the center of the universe, which is a fixed point (*DC* IV.4, 311b22), so once earth reaches the center of the universe, it comes to rest since earth cannot move downward anymore.[97] While fire is absolutely light and it cannot have any weight, so it naturally moves upward, toward the extremity of the universe.[98] Just as earth fails to move upward, so fire fails to move downward; for fire has no weight even in its own place, as earth has no lightness. Considering that earth is absolutely heavy and fire is absolutely light, for the intermediate elements, Aristotle argues that water and air are relatively heavy and relatively light[99], which means that water and air are lighter than earth but heavier than fire.

By this point, we have discussed the different kinds of heaviness and lightness of the four sublunary elements. In order to have further evidence for the determinate places of the four elements, we need to turn to *Phys* VIII.4, where Aristotle connects his account of lightness and heaviness, in terms of elemental natural tendency, with his thought of potentiality and actuality. For instance, fire and earth are moved naturally when they are moved towards the actuality which they potentially can attain (*Phys* VIII.4, 255a30). If the elements move naturally, it means that it is possible for them to change their potentiality into actuality, and when sublunary elements get to their determinate places, they finally realize their actuality.[100] Aristotle demonstrates that the light things explain his thought, saying that 'To be in a certain place, i.e., up, is the actuality of the light' (*Phys* VIII.4, 255b10–11). The actuality of the light is to be somewhere, namely up. But when the light is in the opposite place, its actuality is being prevented (*Phys* VIII.4, 255b12). It can be inferred that the four sublunary elements realize their actuality by being at their determinate places. The actuality of light things is to be up, and this upward place is the realization of the actuality of light things. Light things are moving to their determinate place because of their lightness, and by being there, light things achieve their absolute actuality. And considering the four elements move to their determinate places by their natural motion, their natural motion can

[97] See *DC* I.8, 277a12–23; IV.2, 308b13–14; IV.4, 311a20–21; IV.4, 311b20–25.

[98] Ibid.

[99] See *DC* IV.4–5.

[100] It seems to me that Aristotle's view of elemental motion here is closely related to his definition of motion in *Phys* III.1–3, where he defines the motion as the incomplete actuality of the mover and moved, which will end with the complete actuality. In this respect, this explanation shows the realization of a final end.

be regarded as a realization of their potentiality. Aristotle then tries to answer the question why light things and heavy things move into their own place:

> The reason for it is that they have a natural tendency towards a certain position; and this is what it is to be light or heavy, the former being determined by an upward, the latter by a downward, tendency.
>
> *Phys* VIII.4, 255b15–17 (trans. R. P. Hardie and R. K. Gaye)

According to this passage, the reason why elements move towards their determinate place is that they move following their natural tendency. As we have examined above, earth is absolutely heavy while fire is absolutely light; and water and air are both endowed with relatively heavy and relatively light qualities. Earth moves to its own place since it is absolutely heavy and naturally somewhere. Fire moves to its own place since it is absolutely light and naturally somewhere. For the intermediate elements, water and air, they move to their own places (air goes to its own place above water, while water goes downward below air) since they are both relatively heavy and relatively light. The determinate places of the four elements show their different natural tendencies and define the range of their movements in the universe. Moreover, the determinate places of the elements define what the elements are and how they naturally move, as Aristotle puts it: 'the one defined by the up and the other by the down'.

Now, we return to *DC* IV.3, where Aristotle again poses the question why some bodies move always and naturally upward and others downward, while others again move both upward and downward. Aristotle then answers that which produces upward and downward movement is that which produces weight and lightness and that that which is moved is that which is potentially heavy and light, and the movement of each body to its determinate place is motion towards its own form[101] (*DC* IV.3, 310a16–b2). His argument here is similar to his discussion in *Phys* VIII.4. We have seen that it is the fire which always and naturally moves upward since fire is absolutely light, while it is earth which always moves

[101] Although Aristotle here treats each body's natural tendency to its determinate place as a formal cause, according to my understanding of Aristotle's argument in *DC*, I believe that it is also a final cause. Scholars are divided on this point. For the rejection of the opinion that a determinate place is any sort of cause, see Machamer (1978, 385); Charles (2012, 20); Algra (1995, 192–221). For the agreement on the view that the natural tendency of elements to their determinate places is the explanation of final cause, see Lang (1998, 271–275); Bodnár and Pellegrin (2006, 280–282); Leunissen (2010b, 215); Gill (2010, 157).

downward since it is absolutely heavy. The two intermediate elements, water and air, again move both upward and downward since they are both potentially heavy and potentially light. These four sublunary elements are naturally moving towards their determinate places. But where are their determinate places? This question is closely linked to Aristotle's definition of the boundary of the universe. As said above, Aristotle posits that the universe has two boundaries: its center and its outermost extremity (*DC* IV.3, 310b7–8). The boundary of the universe is the boundary of the containing body at which it is in contact with the contained body (*Phys* IV.4, 212a5–6). Hence the place of a thing is the innermost motionless boundary of what contains it (*Phys* IV.4, 212a20–21). It can be seen that the motion of the elements can only move within the boundary of the universe. As regards the determinate place of earth, since earth is absolutely heavy and it cannot have any lightness, it sinks to the bottom of all things and moves towards the center of the universe, which is a fixed point (*DC* IV.4, 311b22). Once earth reaches the center of the universe, it comes to a rest since earth cannot move downward anymore.[102] Thus the center of the universe is the determinate place of earth.

However, Aristotle does not say explicitly what the determinate place of fire is. Following his discussions on the natural tendency of fire, Aristotle first indicates that fire is always light and moves upwards (*DC* IV.2, 308b13–14) and stresses that fire, so long as there is no external obstacle, moves upward (*DC* IV.4, 311a20–21). Then he claims that fire cannot have any weight and is capable of rising to the surface of all things, and people can observe fire to move upward even in air itself while the air remains at rest, thus fire is moving towards the extremity of the universe (*DC* IV.4, 311b20–25). As we have seen, in Aristotle, the celestial sphere is made up of aether, which performs circular motion, and the celestial sphere is eternal and has no corruption or generation (*DC* I.3, 270b1–12). This means that fire cannot exist in the celestial sphere since fire is destructible (*DC* I.3, 270b12–16); if the element fire could move beyond the sublunary sphere and reach to the celestial sphere, this would mean that the celestial sphere was not merely made up of aether, thus the celestial sphere would also be generable and destructible. This case is impossible since Aristotle clearly posits that the celestial sphere is eternal. Therefore, it is impossible that fire can move beyond the

[102] See note 100.

sublunary sphere, thus we can infer that the determinate place of fire is the extremity of the sublunary sphere.[103] The determinate places of the intermediate elements water and air are between the determinate places of earth and fire[104], and the determinate place of air is always above water[105].

Accordingly, regarding the determinate places of the four sublunary elements, it seems that the sublunary sphere presents a hierarchical order of the four elements: the extremity of the sublunary sphere is the determinate place of fire;

[103] Many interpreters hold that the final goal of fire is the extremity of the sublunary sphere. See Guthrie (1971, 243–244); Cohen (1994, 154–155; 1996, 40–41); Bodnár (1997, 97–98); Matthen (2001, 180–181; 2010, 123). I follow their discussions and consider the extremity of the sublunary sphere to be the determinate place of fire. Apart from the evidence from their arguments, I would like to add another evidence for my claim: the celestial sphere is eternal while the sublunary world is changeable, but fire is perishable, so fire cannot exist in the celestial world (see my detailed discussion above). However, there are also some scholars who hold that fire stops moving up when it reaches the sphere of the Moon, not because that is the natural goal, but because it can move upward no further. The most representative scholar is Gill (1989, 235–240; 1994, 31; 2010, 143–144). Gill welcomes Bodnár's label for Aristotle's cosmos: it is pressurized—at least the sublunary region is, but she claims that fire stops moving up when it reaches the sphere of the Moon, not because that it its natural goal, but because it can move upward no further. As for this claim, she refers to *DC*, I.8, 276a22–30, which, however, can be taken as counter-evidence to her position. Here Aristotle distinguishes natural motion and rest from enforced motion and rest, and the mention of natural rest could suggest that the elements have a principle of rest, as well as a principle of motion, Gill thinks that both natural and enforced elemental motions are limited by something external to the element. Rest at the center is natural for earth, because earth has arrived at its 'like' (Gill believes *DC* IV.3 treats the place of earth as its form and designates that place as its 'like'). Rest away from earth's own place is enforced, because earth's downward motion is impeded by something other than its 'like'. For the passage of Gill's evidence, in my mind, I am sceptical to her view that this passage suggests elements have a principle of rest as well as a principle of motion, but I prefer to think that Aristotle's purpose is merely to compare the natural motion and enforced motion as well as the enforced rest and natural rest since Aristotle then further emphasized that if a given movement is due to enforcement, its contrary is natural (*DC*, I.8, 276a27–28). Sisko (2002) holds a similar view as Gill's, but as evidence he is citing *DC* IV.5, 312b2–19, where Aristotle discusses the intermediate elements, air and water. Sisko thinks this passage suggests the intermediate elements are not programmed to stop in the intermediate places either: they stop where they do because their motion downward is impeded by the element below. In my view, for this passage, I think Aristotle does not mean that the motion of intermediate elements is 'impeded' by the element below, but means that the ordering of the intermediate elements can be reversed, since air is like fire, but also like water; and water is like air, but also like earth (see *DC*, IV.3, 310b11–15). Moreover, it seems that, in Aristotle, the four sublunary elements are defined in relation to their natural tendencies and determinate places. These four elements naturally move towards their determinate places, and they come to a rest when they naturally reach their determinate places. For fire, it does not stop as a result of the impediment of the sublunary boundary, but it stops at the extremity of the sublunary sphere because it reaches its determinate place and naturally rests.

[104] The reason is that water and air are lighter than earth but heavier than fire and thus are both endowed with relative heaviness and relative lightness (see *DC* IV.4–5).

[105] The reason is that only considering the water and air, air goes upward to its determinate place above water, while water goes downward to its determinate place below air (see *DC* IV.5, 313a6–13).

the center of the sublunary sphere (also the center of the universe) is the determinate place of earth; the determinate place of air and water is between the determinate place of fire and earth, while the determinate place of water is always below the determinate place of air.

Now we have investigated the orientation of the four sublunary elements towards their determinate places. The determinate place of an element's motion determines its direction. Fire goes upward and not downward since its final goal (end) is the extremity of the sublunary world, while earth goes downward and not upward since its final goal (end) is the center of the sublunary world (also the center of the universe). When an element naturally reaches its determinate place, it realizes its actuality and comes to a rest. In this respect, it seems to me that the orientation of each sublunary element towards its determinate place can be considered as the explanation in terms of the final cause.

Although the final cause plays an important role in the field of the four sublunary elements, as far as ensuring a unified explanation is concerned, my contention is that the final cause alone cannot guarantee a unified explanation in this field. This is based on the following reasons. Firstly, it is through the explanatory framework of final causation that the four sublunary elements are naturally moved toward their determinate places, thereby generating four distinct, concentrically ordered spheres. In this process, each element actualizes its potentiality, fulfills its natural end (telos), and attains a state of rest. In this way, it seems that final cause is not unifying since the actual condition of the world is not in agreement with the application of the final cause, but changing the sublunary world into a state of rest and there would be no generation and corruption. Thus, in this situation for the generation of any complex substances, for instance, living things, would be impossible. Secondly, only considering the explanation of the final cause, the four sublunary elements have their own determinate places which are different from each other. It can be observed that each sublunary element naturally moves toward its own determinate place, doing so separately and independently, without direct interaction with the other elements. Consequently, it appears that the role of the final cause alone cannot account for a unified explanation of the motion of the four sublunary elements. In fact, Aristotle seems to implicitly acknowledge the limitations of final causality in this domain, as he does not discuss its unifying function in relation to the sublunary elements. Rather, he emphasizes a form of unity that does not rely on an appeal to final causality,

instead describing a hierarchical order in which each higher element is related to the one below it, thereby interlinking the elements (*DC* IV.3, 310b13–15). This hierarchical structure suggests that the natural motion of the sublunary elements, rather than demonstrating the unifying function of final causality, instead highlights the indispensable role of the efficient cause in the generation and ordering of the natural world. In this sense, the causal framework of the sublunary realm may be seen as a compelling instance of unified causation, where the interaction between elements is primarily governed by their efficient causes rather than by a single, overarching final cause.

Having examined the limitations of the final cause in the field of the four sublunary elements, now we turn to the role of the final cause where the celestial element —aether— is concerned.

2.2.2 The Limitation of Final Causation in Aristotle's Explanation of the Heavenly Element

In Aristotle's universe, the sublunary realm is filled up with the four sublunary elements—earth, water, air and fire, whose natural motion is rectilinear. These four sublunary elements have their own determinate places which are different from each other. In contrast, Aristotle supposes the existence of the fifth element, aether, to be the element of celestial sphere, and he posits that the celestial realm is filled with aether[106], which naturally and eternally performs circular motion[107]

[106] For Aristotle's evidence of the existence of the element aether, see *DC* I.3, 270b1–25. Firstly, Aristotle believes that the element of heavenly bodies must be different from the material in sublunary world since the heavenly sphere is divine sphere (*DC* I.3, 270b1–12). Secondly, Aristotle posits that the heavenly realm is eternal and without generation and corruption, thus the element of heavenly bodies must be eternal and different from the earth, water, air and air in sublunary world. (*DC* I.3, 270b13–16). Thirdly, in Aristotle's thought, the heavenly bodies are eternal since in all of the past time with respect to the records handed down from one generation to another, neither the whole of the outermost heaven nor any proper part of it has ever apparently changed (*DC* I.3, 270b17–22). Fourthly, Aristotle believes the word 'aether' originates form the meaning of 'always running' (ἀπὸ τοῦ θεῖν ἀεί) for an eternity of time, since in Greek traditions people believe that the element of heavenly realm is better and higher than the four elements in sublunary world (*DC* I.3, 270b23–25).

[107] Many commentators believe that the introduction of aether is Aristotle's great innovation within the elemental theory. For instance, Solmsen (1960, 289) points out that Aristotle's aether endows the heavenly bodies with physical bodies, and therefore non-physical agents being again eliminated from the cosmos; Longrigg (1975, 213) comments that Aristotle's innovation of aether has certain

(*DC* I.2, 269a1–9).

In the previous part, we have examined how the orientation of each sublunary element towards its determinate place can be understood as the role of the final cause, but what is the role of the final cause in the motion of the celestial element—aether?[108] Can the final cause guarantee a unified explanation in the motion of aether?

According to the discussion of the role of the final cause in the motion of the four sublunary elements, it can be seen that the role of the final cause is related to their natural tendency towards their determinate places. Moreover, in *Phys*, Aristotle defines natural motions in terms of their endpoints. And for something to have the property to move in a certain direction is for it to be able to arrive at its goal or final end[109]. Considering that aether naturally and eternally performs circular motion, we should first discuss its natural motion to examine whether this is the work of the final cause. Considering that Aristotle clearly says that the natural motion of aether is circular motion, we need to examine the circular motion of aether.

However, Aristotle's general reliance on the final cause to explain the motion of aether seems to be limited. Moreover, it is difficult to find the role of the final cause in the natural motion of aether since it is unclear what the motion of aether is for the sake of, or its purpose or end. In *Phys*, Aristotle demonstrates that only circular motion can be continuous, such in contrast to rectilinear motion, so it can be seen that there is no beginning or end in the case of circular motion (*Phys* VIII.8, 261b27-265a2). Considering that the natural motion of the four sublunary elements is rectilinear motion which cannot continue without limit[110], there are final ends or determinate places in the natural motion of these four sublunary

advantages: 1) it enables Aristotle to abolish the psychophysical dualism of Plato and brings the heavens within the sphere of physical explanation; 2) Aristotle's theory that the heavenly bodies are made of an eternal element, never subject to change but undergoing incessant circular motion, is in complete harmony with Aristotle's firm conviction of the eternity of the cosmos; 3) it is also fully in accordance with the phenomena, since records gathered for generations revealed no change in the heavens. Besides, it is a traditional belief in ancient Greece that the celestial sphere is more divine than the sublunary world.

[108] Although some scholars hold the view that final cause also applies to the motion of aether, they do not explain what is the end or purpose in the motion of aether in Aristotle's project. For instance, see Rist (1965, 339); Owens (1968, 165); Balme (1965, 8); Johnson (2005, 131–145); Lang (1998, 276) and Lloyd (1996, 161).

[109] See *Phys* VIII.9.

[110] For the natural motions of the four sublunary elements, see chapter 2.2.1.

elements. When the four sublunary elements naturally reach their determinate places, they realize their actuality and come to a rest. But the circular motion of aether is endowed with unlimited continuity, meaning that the circular motion has no end and rest, so it is impossible for circular motion to have its determinate place or to come to a rest. Considering that the orientation of each sublunary element towards its determinate place apparently depends on the role of the final cause, it seems that there is no final causal explanation of this type in the circular motion of aether. Moreover, as discussed above[111], it is through the final cause that the four sublunary elements actualize their potentiality and reach their natural ends upon arriving at their determinate places. However, the case of circular motion presents a unique challenge to this framework. Aristotle characterizes circular motion as complete and everlasting (*Phys* VIII.9, 265a16-b8), which raises the question of whether it has a distinct final end. One might argue that, since final causality entails the realization of actuality, the celestial spheres, by continuously engaging in circular motion, are perpetually at their final end. However, this interpretation is complicated by Aristotle's definition of motion as the actualization of potentiality, which suggests that motion itself cannot be a continuous state of pure actuality. Thus, there is no need for the final cause in the circular motion of aether in the sense of final end. In the *DC*, Aristotle further provides arguments for the fact that there is no contrary to circular motion:

> the motion (circular motion) goes from the same point towards the same point, and contrary motion was distinguished as motion from a contrary to its contrary.
>
> *DC* I.4, 271a20–22 (trans. J. L. Stocks)

Aristotle argues that circular motion cannot be integrated into a system of contrary motion. Contrary motion can occur between contrary places. But for circular motion, there is no motion contrary to it[112]. Circular motion occurs not from one

[111] Ibid.

[112] The absence of a contrary to circular motion is central to Aristotle's argument that celestial bodies, which naturally exhibit circular motion, are not subject to generation and corruption. He states: 'It is equally reasonable to assume that this, i.e., the fifth body, will be ungenerated and indestructible and exempt from increase and alteration, since everything that comes to be comes into being from a contrary and some substrate, and passes away likewise in a substrate by the action of a contrary into a contrary' (*DC* I.3, 270a13–16). By this reasoning, celestial substances, composed of the fifth element, or aether, differ fundamentally from sublunary entities, which undergo change due to the presence of contraries. Since no contrary motion exists to oppose the natural circular motion of

contrary to the other, but is from the same place to the same place since the motions which take place in opposite directions along the same circle are not contrary to one another. So, it seems that circular motion is in a state of complete actuality and is always in the same place, which is different from the rectilinear motion of the four sublunary elements. Aristotle also offers a battery of arguments to explain the differences between the circular motion of aether and the rectilinear motion of the four sublunary elements[113]. According to Aristotle's argument, for each thing there is at most one contrary, and the natural motion is the contrary of unnatural motion, while upward motion and downward motion are the contraries of one another (*DC* I.2, 269a9–13). Hence, the motion upward is the contrary of motion downward. If one thing moves upward naturally, its only contrary motion will be motion downward, and if one thing moves downward naturally, its only contrary motion will be motion upward. So, if something moves in a circular manner unnaturally, then its natural motion will be contrary to the circular. But for one thing there is one contrary; and upward and downward are contraries of one another. If there is some other body which moves in a circular manner unnaturally, there will be some other motion natural to it. But this is impossible, since if it moves upward naturally, it must be fire or air, and if it moves downward naturally, it must be earth or water (*DC* I.2, 269a15–20). Thus, since Aristotle is committed to the principle that for one thing there can be one contrary at most, it is excluded that a rectilinear motion is contrary to circular motion. Moreover, no circular motion can be contrary to circular motion. So, it can be seen that there is no motion contrary to circular motion, which occurs from the same place to the same place. Therefore, although the natural tendencies to the determinate places of the four sublunary elements can be explained by final causal explanation, the natural tendency of aether to perform circular motion cannot be explained by the final cause within Aristotle's theory in the same way as the four sublunary elements.

According to some interpreters[114], the circular motion of the heavenly bodies is best understood as an imitation of the immobility of the Unmoved Mover, which serves as the ultimate final cause. In this reading, celestial motion is not final in

---

celestial bodies, Aristotle concludes that they must be imperishable and exempt from the processes of coming-to-be and passing-away that characterize the terrestrial realm.

[113] See *Cael* I.2.

[114] E.g., Kahn (1985, 198); Wisnovsky (2003, 133–134); Richardson (2004, 82) and Johnson (2005, 257).

itself but is directed toward an extrinsic final cause—the Unmoved Mover—whose unchanging actuality provides the explanatory principle for its continuous motion. This interpretation aligns with Aristotle's broader teleological framework, wherein natural entities move not arbitrarily but in pursuit of an end. Thus, rather than seeing the final cause and the Unmoved Mover as distinct explanatory principles, their joint involvement in celestial motion may reinforce the coherence of Aristotle's causal system, integrating both the internal orientation of the heavens toward perpetual motion and their ultimate reference to a transcendent actuality. Although Aristotle explicitly says that the motions of the four sublunary elements imitate (μιμεῖσθαι) the circular motion of aether (*GC* ii.10, 336b25–337a7), he did not say in so many words that the circular motion of aether imitate the Unmoved Mover. However, he left some hints that the motion of heavenly bodies is for the sake of the Unmoved Mover in *Meta*[115] (*Meta* XII.7, 1072b13–31). Moreover, even if the circular motion of aether can be understood as an imitation of or a kind of love for the Unmoved Mover, this form of final causality differs fundamentally from that which governs the motion of the four sublunary elements. While the movement of aether is directed toward the Unmoved Mover as an ultimate object of aspiration, in the sublunary realm, the final cause operates in terms of end-place, determining the natural tendencies of elements to move toward their proper locations. This distinction raises a problem of continuity: if final causality functions differently in the celestial and sublunary spheres, can it still serve as a unifying explanatory principle for the motions of all elements in Aristotle's cosmos?

This issue is further complicated by a fundamental problem of discontinuity within Aristotle's theory of the five elements. The celestial sphere, composed of aether, naturally and eternally engages in circular motion, whereas the four sublunary elements exhibit rectilinear motion. Crucially, there appears to be no direct interaction or causal connection between the motion of aether and that of the sublunary elements, raising the question of how Aristotle accounts for the coherence of the physical cosmos as a whole. I will argue that this apparent discontinuity is resolved through Aristotle's concept of the efficient cause, which provides the necessary explanatory link between these two domains and ensures

[115] In chapter 2.2.1, I am dealing with the role of final cause only in the field of the motions of Aristotle's five elements. For the role of Unmoved Mover as a final cause of the heavenly bodies' motion, see chapter 2.1.1.

the overall continuity of his cosmological framework. Thus, we may conclude that Aristotle's final cause cannot ensure a coherent explanation covering the motion of the sum-total of elements.

2.3 The Limitation of Final Causation in Aristotle's Explanation of Meteorology

Having explored the role of the final cause in the domain of the motion of elements, I now turn to examine its role in Aristotle's explanations in the field of meteorology. This investigation seeks to address whether final causal explanation can be meaningfully applied to meteorological phenomena. For Aristotle, meteorology is a part of the science of nature (*Meteor* I.1, 338a20–b4) and Aristotle's science of nature involves the knowledge of all four causes[116], so the final causal explanation can be presumed to apply to the field of meteorology. However, in *Meteorology*, Aristotle investigates various meteorological phenomena between the upper and lower realms of the universe with reference to matter and sources of motion[117] and it seems that there is no role to be found for the final cause. For Aristotle, meteorological phenomena occur as a result of the four sublunary elements—earth, water, air and fire—as 'the material cause of the events of this kind (meaning by 'material' what is subject and is affected)' (*Meteor* I.2, 339a28–29), and the eternally moving bodies as 'the cause whence the motion originates' (*Meteor* I.2, 339a30–31). Thus, there does not seem to be room for the role of final cause in the field of meteorology.

However, although it is difficult to find the application of the final cause in Aristotle's field of meteorology, in *Phys* II.8 there is debatably a case in Aristotle's explanation of the final cause which uses a meteorological phenomenon, rainfall, as an example. What is up for debate in *Phys* II.8 is whether Aristotle is supporting the position that rainfall can be explained through final causal explanation—that

[116] See e.g., *Phys* II.2, 194a 9–18; II.3, 194b15–25; *Post* II.11, 940a20–28; Falcon (2005, 14–16).

[117] The source of motions can be considered as the explanation of efficient cause in Aristotle ('efficient cause' is Aristotle's technical term for 'source of motion'). For the definition of Aristotle's efficient cause, see chapter 1.3.

rainfall exists for the sake of the growth of crops. There are two kinds of view on this point, both based on the same arguments from *Phys* II.8: one takes the statement about rainfall to be Aristotle's own example of for the sake of which—that is to say, an example of a process that according to Aristotle can be explained by final cause;[118] the other takes it to be merely the meteorological process without the role of final cause[119]. Since these interpreters come up with opposite conclusions from the same passages of Aristotle[120], it is necessary to investigate the rainfall example in *Phys* II. 8 and to examine exactly what Aristotle says in these passages.

Here, Aristotle first raises a difficulty (ἀπορία): what prevents the meteorological phenomena to be neither for the sake of something, nor for the sake of the better (*Phys* II.8, 198b16–17)? Take for example, the event of rainfall. What if the sky does not produce rain in order to make the crop grow, but out of necessity (for what rises up must be cooled and what is cool becomes water and must fall down)? In that case, the crop's growth just happens as a result of this event. Similarly, if a man's crop is spoiled on the threshing-floor: the rain did not fall for the sake of this—in order that the crop might be spoiled—but this result just followed (*Phys* II.8, 198b20–22). This example suggests that rainfall does not occur for the sake of something: the growth of crops seems to be the incidental beneficial outcome of the rainfall—testify the fact that rainfall sometimes can also spoil the crop. Along these aporetic lines, rainfall is due to necessity and to have incidental results, in contrast to an explanation in terms of final cause. Rainfall is explained as a meteorological process: what is drawn up must cool, and what has been cooled must become water and descend, thus the rainfall occurs. Aristotle then brings forward the example of teeth: if teeth do not exist for an end, it is merely a coincident that the front teeth are sharp, which makes them fit for tearing, while the molars are broad and useful for grinding food. What prevents teeth to be thus, not for the sake of something, but of necessity[121]? And similarly, regarding

[118] For recent interpreters who hold that meteorological events like rainfall can be explained by final cause in Aristotle, based on the passages in *Physics* II. 8, see Owens (1976, 159–173); Balme (1987a, 275–286); Cooper (1982, 217–218); Furley (1985, 177–182; 2002, 76); Scharle (2008a, 150–154), Leunissen (2010a, 69–72) and Horn (2016, 283).

[119] For recent interpreters who reject the role of final cause in the example of rainfall, based on the same passages in Aristotle, see Nussbaum (1978, 60–62); Johnson (2005, 150–152) and Charles (2012, 18–19).

[120] See Charles (1991, 12–13) and Code (1997, 128–129).

[121] Aristotle here employs Democritus's viewpoint that teeth do not exist for a final end, but out of

other parts of a body (*Phys* II.8, 198b26–30). Moreover, for the example of an eye's color, Aristotle posits that it is necessary that an eye has a certain color, but having grey or blue eyes is not for the sake of anything (*GA* V.1, 778a29–b19). It is evident that Aristotle introduces these examples to illustrate that certain things arise out of necessity or as a consequence of hypothetical necessity, but not for the sake of an end.

By means of this aporetic reasoning, then, Aristotle argues that in the case of rainfall necessity applies , since it is difficult to find the rainfall occurs for the sake of anything, which is merely a coincidental result, thus there does not seem to be a role of final cause in the example of rainfall.

Still, there is a scholarly debate on whether rainfall can be considered as a case of final causal explanation or not at all? It seems that the interpreters' arguments, no matter whether they agree or disagree with the role of final cause in Aristotle's rainfall example, are all based on the following passage:

> But it is impossible for things to be that way. For these and all <other> natural things come about in a given way (οὕτω198b5) either always or for the most part, but that which is by luck and by spontaneity does not. For it does not seem to be by luck or spontaneity that it rains a lot in the winter, but only if it does in the summer. Nor does a heat wave in summer, but only in winter. So, if it seems to be either by spontaneity or for the sake of something, and if they cannot be by coincidence or spontaneity, then they are for the sake of something. But that all these things are by nature, even those saying such things would agree. Therefore, action for an end is present in things which come to be and are by nature.
>
> *Phys* II.8, 198b34–199a8 (trans. R. P. Hardie and R. K. Gaye)

Aristotle in this passage returns to discuss winter's rainfall. The debate is more general: rainfall serves as an example of whether rainfall can be considered as a case of final causal explanation. Aristotle here notes that rainfall happens a lot in winter, and implies that the winter rainfall comes about always or for the most part and happens by nature. Aristotle posits that natural things either come to be for

---

necessity. However, Aristotle later stresses that Democritus's viewpoint is right in so far as it is applied to certain individual cases, but he is wrong in making it of universal application (*Phys* VIII.1, 252b3–4).

the sake of something, or they do so spontaneously. Based on this aporetic passage, some recent scholars argue that Aristotle's account of the necessity of rainfall parallels his final causal explanation of certain biological features, such as teeth, which exist for the sake of tearing and grinding food. While Aristotle distinguishes between events that occur either spontaneously or for the sake of something, these scholars suggest that he may nevertheless allow for a teleological explanation of rainfall—namely, that it occurs in accordance with a final cause.[122]. Some other scholars even posit that the end purpose of rainfall is for the sake of human beings since the rainfall can make the crop grow.[123] However, for the meteorological

[122] This line of argument was specifically clarified by Furley (1985, 177–182) and Cooper (1982, 216–218). For a helpful overview of the subsequent debate on Furley's comments, see Scharle (2008a, 149–151). Furley is the most representative scholar who has clarified the passages of rainfall example in *Phys* II.8 and believes that rainfall can be explained by the final cause. Furley further comments that there are two kinds of interpretation of Aristotle's final causal explanation: the first interpretation would tend to the view that final causal explanation in Aristotle only applies to the field of biology; the second interpretation would imply a much wider application of final cause—perhaps embracing all the works of the whole natural world (1985, 177).

[123] Some scholars have argued that rainfall, within Aristotle's framework, has a teleological explanation and ultimately serves human purposes, as it enables the growth of crops. Sedley (1991, 179–182), for instance, advocates for an anthropocentric interpretation of Aristotle's final causal explanations. He contends that winter rainfall occurs for the sake of human agriculture and that human beings constitute the that for the sake of which in the sense of beneficiaries of a goal-directed process (Sedley 1991, 179). According to this view, rainfall is not merely an incidental occurrence but is directed toward the sustenance of human life. However, I argue that rainfall cannot be adequately explained through Aristotle's notion of final causality. While Aristotle applies teleological explanations to many natural processes, meteorological phenomena like rainfall do not fit within his framework of purposiveness. My objections to Sedley's interpretation are as follows. Firstly, Aristotle's teleology is not anthropocentric, nor does it extend to all natural phenomena. While Aristotle describes biological processes teleologically—explaining, for instance, that an acorn grows into an oak tree for the sake of achieving its mature form—he does not extend this principle to inanimate processes such as rainfall. The universe is not systematically arranged for human benefit, and Sedley's claim that Aristotle views rainfall as serving human agriculture overextends Aristotelian teleology. Secondly, rainfall does not exhibit the characteristics of final causality. Aristotle's final causes explain processes that are goal-directed, meaning they exhibit intrinsic tendencies toward a specific end-state. However, rainfall results from material and efficient causes alone—it occurs due to the condensation of water vapor and atmospheric conditions, not from an inherent tendency toward a particular purpose. While rain may incidentally benefit human agriculture, this does not imply that it occurs for the sake of human survival. Thirdly, Sedley himself acknowledges a tension in his argument. He notes a contradiction between interpreting final causes in terms of specific species' needs (e.g., rain benefiting humans or animals) and understanding them as part of a larger teleological system. If rainfall were to be explained teleologically, it would need to have a single, determinate telos; yet, it serves multiple functions across different species and ecosystems. This suggests that rainfall does not have a final cause but instead operates within the broader framework of material and efficient causation. Thus, rainfall should not be understood in teleological terms within Aristotle's philosophy. Meteorological phenomena such as rainfall lack an intrinsic goal-directed nature and can be sufficiently explained by material and efficient causes alone. Consequently, Sedley's attempt to attribute a final cause to rainfall misinterprets Aristotle's

phenomenon of rainfall, Aristotle does not suggest that it happens either by chance or for the sake of something since he argues that many of these phenomena occur by necessity without the involvement of either chance or a final cause (*Phys* II.4, 196a25–b9). The rainfall occurs because of necessary conditions of the movement of elemental bodies in the atmosphere which also depend on the climates and seasons and other meteorological causes.[124]

Therefore, my contention is that according to Aristotle the example of rainfall cannot be explained by its operating as a final cause. Although rainfall can make the crops grow, it is not for the sake of the growing of crops. Moreover, rainfall does not always make the crops grow since the rainstorm could also destroy the crops. For a clearer understanding of Aristotle's view on whether natural processes, such as rainfall, occur for the sake of human ends, we may turn to his discussion in the *Protr* (79.25–80.20). There, Aristotle asserts that art imitates nature, suggesting that human craft operates with purposeful design, whereas natural processes do not necessarily exhibit the same kind of intentionality. He maintains that every process in the arts comes about for the sake of something, reflecting the teleological structure of human action. However, this does not entail that all natural phenomena likewise occur for the sake of human purposes. In this light, while rainfall enables humans to grow crops, its occurrence is not itself directed toward fulfilling human needs. Instead, Aristotle would interpret the phenomenon of rainfall as the result of elemental movements in the atmosphere, governed by physical necessity rather than teleological intention. Nevertheless, within Aristotle's broader framework, the human capacity to harness natural processes—such as using rainfall for agriculture—exemplifies the way in which skill and technology introduce teleology into natural phenomena that, in themselves, lack intrinsic purpose with respect to human ends.

Moreover, Aristotle explicitly expresses the causes of rainfall in *Meteor* and *GC* without mentioning any causes about the crops' need or human needs, for rainfall happening as a result of a concomitant transmutation of the air into water, which Aristotle considers as part of the cycle of evaporation[125]. More precisely,

---

explanatory framework by imposing teleology where Aristotle himself would not do so.

[124] Matthen (2009, 12–13) points out that Aristotle has identified the Sun and the obliquity of its orbit as the overarching cause responsible for the circularity of the seasons and the regularity of rainfall, so this circular process follows the course of the Sun, for according as the Sun moves to this side or that, the moisture in this process rise or falls.

[125] See *Meteor* I.9, 346b16–31and *GC* II.11, 338a14–b19.

Aristotle posits the meteorological phenomenon of rainfall is a result of the circulation of elements in the atmosphere, relating to the orbit of the Sun and the change of the seasons, and is thus a regular natural phenomenon.[126] Therefore, it should be noted that Aristotle does not mention here that rainfall exists for the sake of anything. Moreover, although Aristotle famously maintains that "nature does nothing in vain" (*PA* I.1, 641b12), it is noteworthy that in his explanation of rainfall in Meteorology and GC, he does not explicitly invoke any final cause or purpose. Instead, rainfall is presented as a result of the concomitant transmutation of air into water, which belongs to the regular cycle of evaporation and condensation within the atmosphere. More precisely, Aristotle attributes the meteorological phenomenon of rainfall to the circulation of the elements, governed by the orbit of the Sun and the change of the seasons, thus treating it primarily as a regular and necessary natural process. Therefore, while Aristotle's broader teleological framework assumes that natural processes serve purposes, in this particular explanation he refrains from specifying that rainfall occurs for the sake of crops, humans, or any other end.

According to the discussion above, it may be concluded that some meteorological phenomena, like rainfall,[127] cannot be explained by the final cause in Aristotle's thought. Aristotle investigated various meteorological phenomena between the upper and lower realms of the universe with reference to the matter and sources of motion, and it seems that there does not exist any role for the final cause. In fact, Aristotle examines meteorological phenomena with what can be described as an efficient causal approach and manages to find the efficient causal reasons and influences of the phenomena[128]. He tries to describe why meteorological phenomena happen and gives sufficient conditions for the occurrence of these phenomena, without concentrating on final causation. Considering that in the case of specific meteorological phenomena it is hard to find a role for final causation, it is clear that the final cause cannot guarantee a full explanation in the field of meteorology.

[126] See *Meteor* I.9, 346b14–32; *GC* II.10, 337a1-7 and Matthen (2009, 12–13).

[127] E.g., the rainfall, the droughts and humidity, the incursions and reflexes of the sea, the corruptions and generations of topographic features of the earth.

[128] For the role of Aristotle's efficient cause in the field of meteorology, see chapter 3.3.

2.4 The Limitation of Final Causation in Aristotle's Explanation of Biology

Having examined the limited role of Aristotle's final cause in his explanations in the field of meteorology, now we turn to the next section to investigate the role of the final cause in the field of biology, to make clear how the final cause contributes to a unified explanation in this field. According to Aristotle's biological treatises, living things differ from each other in their mode of living, actions, habits and their parts. Aristotle's approach to study living things is to discuss these differences from a broad and general perspective, and subsequently to speak of these with close reference to each particular genus (*HA* I.1, 487a11–13). Aristotle points out that this approach is the best way to present the results of natural science, which starts with what is general and moves on to the more specific, to avoid overgeneralization and redundancy (*PA* I.1, 639a14–b6; I.4, 644b1–8; I.5 645b9–14). Since the study of living things is also part of Aristotle's investigation of science of nature, and given the fact that Aristotle's science of nature involves the knowledge of all four causes[129], the final causal explanation can be assumed to apply to the field of biology. In fact, Aristotle's utilization of final causal explanation to the field of biology in order to explain living things and their parts and movements is thought to be the most successful and most influential of its uses.[130]

The investigation in this section will be divided into three parts. I start by investigating the role of the soul as a final cause in Aristotle's biology. Then I turn to explore Aristotle's use of explanation in biology based on the soul as a final cause. Finally, although Aristotle's application of final causal explanation is thought to be the most successful in the field of biology, there are some special biological cases that cannot be explained by the final cause and therefore need to be examined.

---

[129] See e.g., *Phys* II.2, 194a 9–18; II.3, 194b15–25; *Post* II.11, 940a20–28; Falcon (2005, 14–16).

[130] Many scholars hold this view, which I also choose to follow, see e.g., Ayala (1970, 46–48); Wieland (1975); Nussbaum (1978); Sorabij (1980) and Johnson (2005, 131–187).

2.4.1 The Soul Operates as a Final Cause in Aristotle's Biology

Aristotle makes explicit that inquiry should be done into some parts of the soul before exploring the living things themselves (*PA* I.1, 641a17–32), and treats the soul as the principle of living things as well the cause of their being alive: 'as it were, a principle of living things' (*DA* I.1, 402a8). So, it seems to me that what is particularly important for our understanding of Aristotle's explanation of the final cause in his biology is the role of the soul in living things[131]. Naturally, we should first investigate the role of the soul in Aristotle's biology in order to discuss the role of the final cause in a unified explanation in Aristotle's biology.

According to Aristotle's discussion in *PA*, his explanation of the souls of living things is closely related to his final causal explanation. Aristotle shows that a living being cannot exist without a soul. If the soul departs from a living thing, what is left is no longer living, and none of the parts remain what they were before (*PA* I.1, 641a19–22). Aristotle therefore believes that it is the duty of natural scientists to study the soul, to study the whole of the soul or that part of the soul which constitutes the essential characteristics of a living thing. And it is also the duty of natural scientists to discuss the attributes that attach to these essential characters, especially the soul as natural substance in the sense of being a final cause or in the sense of being an efficient cause. Aristotle supposes that either the whole soul or some part of it constitutes the nature[132] of living things since it is the presence of the soul that enables matter to constitute the nature of living things, much more than it is the presence of matter which so enables the soul. Thus, it can be seen that the attributes and essential characteristics of the soul, both in terms of the soul as a whole and in terms of that specific part of the soul, should be taken into account since the living things are natural. Moreover, the connection between the efficient cause and final cause can be found in the works of the soul and the

[131] In Aristotle's biology, the stages of living things' developments, which are from embryo, infant, child, adult, and so on, aim at completing all the parts which are capable of performing the functions of the living thing's soul.

[132] Aristotle defines nature as an inner source of change and rest (in respect of place, or of growth and decline, or by way of alteration) in that to which it belongs primarily of itself, and not accidentally (*Phys* II.1, 192b13–14; 192b20–23).

priority of final cause over efficient cause can also be found within Aristotle's investigations.

Furthermore, in *DA*, the soul is supposed to be the principle of living things and the cause of their being alive[133]. More importantly, in *DA* Aristotle explicitly expresses his view that soul as final cause, which is identified as 'for the sake of which', operates in living things:

> And it is clear that the soul is cause also as that for the sake of which. For just as the intellect acts for the sake of something, in the same way also does nature, and this something is its end. Of this sort is the soul in animals in accordance with nature; for all natural bodies are instruments for soul, and just as it is with those of animals so it is with those of plants also, showing that they exist for the sake of soul. But that for the sake of which is so spoken of in two ways, the purpose for which and the beneficiary for whom.
>
> *DA* II.4, 415b15–21 (trans. D. W. Hamlyn)

According to this passage, the soul is supposed to be the final cause of living things. As Aristotle indicates in *PA*, if the soul departs from the living things, what is left is no longer living, and none of the parts remain what they were before (*PA* I.1, 641a19–22). Aristotle here restates the final causal relationship between living things and soul: the instruments of living things that create the potential for the soul are turning into the relation in which a living being exists for the sake of its soul, since the soul is its final cause. This means that the soul operates through its natural bodies, and the capacities of natural bodies are necessary prerequisites for the realization of the capacities for the performance of a living being's life functions that then constitutes its soul.[134] Aristotle here also mentions two kinds of meaning of 'for the sake of which': 'that of which' and 'that for which'. More precisely, 'that of which' means 'aim of something', and 'that for which' means 'to the benefit of which'[135]. In this way, 'for the sake of which' has two kinds of meaning in Aristotle: the aim and the beneficiary.[136] Therefore, this passage

---

[133] See e.g., *DA* I.1, 402a8; II.4, 415b8.

[134] See also Leunissen (2010, 55–58) on natural bodies as instruments and 'existing for the sake of the soul'.

[135] Kullmann (1985, 172). It seems that Johnson (2005, 66) has followed Kullmann's identification of 'that of which' and 'that for which'.

[136] Aristotle refers to two kinds of meanings of the 'for the sake of which' (*DA* II.4, 415b1–7;

explicitly shows the soul is the final cause of living things. On the one hand, Aristotle believes that living things possess biological ontological principles in their nature, in their intrinsic origin of motion and rest, and in their intrinsic orientation towards their completion according to the function of natural bodies. On the other hand, Aristotle considers the soul to be the epistemological principle of living things. The soul is considered to be the final cause and has priority of explanation, since the type of soul determines the function and development of the living being. Therefore, the conception of the soul as a final cause serves as the foundational starting point for Aristotle's teleological explanations in biology, given that the body and its parts in living beings are organized for the sake of the soul.[137]. Thus, it seems Aristotle establishes a unified explanation in the field of biology through identifying the soul as a final cause.

However, in *DA*, Aristotle also indicates that there are different kinds of souls in different levels of living things, with the higher living beings possessing more complex capacities and faculties of soul.[138] For plants, their capacities are merely nutrition and reproduction, therefore the end of plants is growth and reproduction, in terms of the capacities of the soul that they have. For animals, in addition to the capacities of nutrition and reproduction, they also have the higher capacities of appetite, perception and motion, so the end of their life is perception and movement based on the capacities of the soul that they have. For human beings, in addition to the capacities of animals and plants, they also have the capacity to deliberate, so the capacities of a human being's soul are nutrition, reproduction, perception, movement and deliberation, and the end of their life is deliberation. Accordingly, there are five capacities of soul, namely, nutritive-reproduction[139], appetite, perception, movement and deliberation[140] (*DA* II.3, 414a31–32). Plants are endowed with a nutritive-reproductive soul. Animals have the nutritive-reproductive soul, and also have the capacities of perception and appetite in addition to their nutritive soul. If an animal has the capacity of movement, it also has the capacities of nutrition, appetite and movement. If a creature has the

415b19–22; *Phys* II.2, 194a33–36; *Meta* XII.7, 1072b1–5; *EE* VII.15, 1249b14–16). For detailed discussion on the two kinds of 'for the sake of which' in Aristotle, see chapter 2.1.

[137] This is also one of the reasons why it is necessary to first examine the soul itself in this section.

[138] See *DA* II.3, 414a29–415a13.

[139] Aristotle here considers the capacity of nutrition and reproduction to be one and a single capacity.

[140] In *DA*, Aristotle uses 'deliberation' or 'intellect' or 'thinking' to express the capacity of human beings.

capacity of deliberation, then it possesses all the capacities of the soul.[141] Therefore, considering that Aristotle identifies different kinds of souls in the different levels of living things and assumes that the higher living beings possess more complex capacities[142], each living being has its own kinds of soul. Thus, it seems that there is a unified final causal explanation in the fields of Aristotle's biology with respect to the application of the soul as a final cause since all living beings have their soul as their final cause.

Accordingly, in Aristotle's thought, the soul is the principle of living things and the cause of their being alive. And it is clear that the soul is a final cause of living things, that the soul operates through its natural bodies, and the capacities of natural bodies are conditionally necessary prerequisites for the realization of the capacities for the performance of a living being's life functions that constitutes its soul.

2.4.2 The Unified Explanation in Aristotle's Biology Based on the Soul as a Final Cause

Having examined the soul as a final cause gives us the starting point of the explanation of the final cause in Aristotle's field of biology, since the body and parts of living things are organized for the soul, now we continue to investigate the final causal explanations in living things and their parts and movements within this field. According to the discussion above, there are five kinds of capacities of the soul, namely, nutritive-reproduction, appetite, perception, movement, and deliberation[143], and higher living beings possess more complex capacities[144]. So, our discussion will start from the capacity which is most general, namely, the nutritive-reproduction.

Aristotle identifies the nutritive soul as the most primitive and widely distributed power of soul, being indeed the one in virtue of which all are said to have life (*DA* II.4, 415a23–25). It manifests itself in the act of reproducing and

[141] Specifically, in Aristotle's discussion of nutritive and reproductive capacities of the soul, he indicates that the soul is also an efficient and final cause (*DA* II.4, 415b8–12).

[142] See *DA* II.3.

[143] According to *DA*, we can also understand there are five kinds of souls.

[144] See *DA* II.3.

using food, since for any living being that has reached normal development (dependent on its nature and its position in the hierarchy of living beings) unmutilated, and whose mode of reproduction is not spontaneous, the most natural act is the production of another like itself, an animal producing an animal, a plant a plant. And because the nutritive-reproductive capacity of the soul indicates the function of living and reproduction of living things, thus nutrition and reproduction are the most important part of the explanation of the final cause in living things. Moreover, Aristotle explicitly indicates that the first soul ought to be named the reproductive soul since it is right to call things after the ends they realize, and the end of this soul is to generate another being of the same kind (*DA* II.4, 416b23–25) in order that, as far as its nature allows, it may partake in the eternal and divine. So, living things participate in eternity and divinity as far as possible, but since it is impossible for them to share eternity and divinity because they are perishable, they can persist in the same form through reproducing themselves. This is the goal for which all things strive, for which all things do whatever their nature allows.[145] So the soul exists as the final cause of living beings, functioning both as the principle of life and as that for the sake of which the living being exists (the aim and the beneficiary). Whether this pertains to the individual organism or to the species as a whole will be clarified further, particularly in relation to the perpetual existence of living things.

Similarly, in *GA*, Aristotle claims that the business of animals is nothing else than to produce offspring, just as the business of plants is to produce seed and fruit (*GA* I.4, 717a21–22; I.23, 731a24–b8). For plants, their nature does not involve any other function or business than the production of seeds, since this is caused by the union of male and female and that nature has mixed these and set them together in plants, so that the sexes are not divided in them. But for animals, their function is not only to reproduce, which is common to all living things, but they all participate in some kind of knowledge, since they have perception and this is a kind of knowledge. What distinguishes animals from plants lies in perception, but since animals must also live, therefore, when they need to fulfill the function of that which has life, they will unite and copulate. Furthermore, when taking into

[145] On this point, Aristotle considers the phrase 'for the sake of which' can refer to both kinds of meaning: the aim and the beneficiary (*DA* I.4, 415b2–3). See also *DA* II.4, 415b19–22; *Phys* II.2, 194a33–36; *Meta* XII.7, 1072b1–5; *EE* VII.15, 1249b14–16. For detailed discussion, see chapter 2.1.

account not species but individual living things, Aristotle indicates that only individuals can generate other individuals and only individuals can benefit from reproduction and any other function of the soul (*Meta* XII.5, 1071a26–29), thus it should be noted that individual living things are not themselves concerned with the preservation of their species; rather it is the individual's striving for participation in the divine for its own individual benefit which is the true cause of reproduction[146]. Accordingly, Aristotle treats the soul's nutritive-reproductive capacity as the fundamental function of living things, both for plants and animals, and his explanation of this function of living things serves as the basic explanation of the final cause in his biology. This function is the same for all living things since all the living things need to reproduce to continue their existence since no living thing can exist for the sake of anything adverse to its own survival or reproduction[147]. The perpetual existence of living things is considered to be the fundamental level in Aristotle's explanation of the final cause.[148]

Moreover, given that all living things exist for the sake of their survival and reproduction, in addition to the final causal explanation of individual animal kinds, Aristotle also focuses on the distribution and configuration the parts of living things to demonstrate the explanatory role of the final cause[149]. Aristotle uses the

---

[146] For this view, see Cooper (1995, 588); Balme (1965, 13–14; 1987a, 279–80); Code (1997, 137–142); Lennox (2001a, 133–137) and Johnson (2005, 177–178). Cooper (1995, 588) and Lennox (2001a, 133–137) suppose that the production of living things is for the sake of the life, activities and the good of the individual living things that are reproduced, and not just for the sake of eternity of the plant and animal species. The other three scholars further make a distinction between final causal explanation in species and in individual living things. In Balme's view (1987a, 279–80), the immortality existence in species is regarded by Aristotle as a fact, and the explanation of this requires two kinds of things: first is the clarification of the cause for the sake of which this happens, for example, why it is good; the second is the necessitating condition to make this possible. Code follows Balme's view and considers the first is provided for simply by positing the good for the individual living things, whose species persists through the process of their reproduction. Johnson even identifies the animal as a kind or species that is 'for the sake of', while the individual living things is 'for the benefit of'.

[147] See Sedley (1991, 191) who says that each being serves both for its own ends and those of the next link on the food chain. Wardy (1993, 26) further shows such a situation would always create a conflict of interest due to the species lower on the food chain, and thus becomes a problem of final causal explanation.

[148] See also Cooper (1995, 587) on the most fundamental level of the explanation of final cause in Aristotle.

[149] For the relationship between living beings and their parts, according to Aristotle's *PA*, the parts are truly parts only if they belong to a living thing and are able to function for their life. Parts and their differentiations are explained foremost in terms of the functional contribution they make to the animals as a whole. See also Leunissen (2010, 113–114).

example of a man and his parts to express why it is necessary to explore the parts of living beings (*PA* I.1, 640a33–b4). A man has such and such parts since the parts are necessary conditions of a man's existence. Thus, it is impossible to be otherwise, or, in any case it is good that they should be there, namely, the living things are better because of the presence of the parts. Aristotle also illustrates some examples of how a final causal explanation with respect to the parts of living things should be made. In general, the parts of living beings may be either instrumental (meaning they exist for the sake of supporting some other part, process or activity[150]), or sensitive (meaning they exist for the sake of the most basic function, e.g., the perception of animals) (*PA* I.1, 641a2–3). For instance, the lung[151] exists for the sake of respiration (*PA* III.6, 669a15), while respiration exists for the sake of refrigeration, namely, internal temperature maintenance of living beings (*Resp* 16, 478a25–30). The basic process is the respiration and expiration of air due to 'counteracting' temperatures. Nutrition increases the internal temperature, making the lungs expand; the expansion of the lungs causes cool air to flow in, which has a chilling effect; the cooled lungs thus contract, and this contraction forces air back out. The expired air is warm because of its contact with the heat resident in the organs. Cool air is drawn in, counteracted by the hot, and then expired, and so forth[152]. Hence the main procedure here is the balance of temperature between hot and cold, but Aristotle does not use this example to demonstrate the breathing process, instead he uses it to demonstrate the role of the final cause in explaining the action in terms of its purpose or goal. Another example is the flesh, flesh exists for the sake of the perception of touch, so flesh exists around the bones, and is attached to the bones through thin fibrous bands, and it is for the sake of this that the bones themselves exist (*PA* II.8, 653b19–29). Besides the bones, the sinews, the blood vessels, the hair, the various kinds of nails, the skin and so forth exist for the sake of the security of the sensitive parts (*PA* II.8, 653b31–34). Additionally, Aristotle's demonstrations of eyes, eyelids, eyebrows and eyelashes are all related to this point, since eyelids, eyebrows and eyelashes all exist for the sake of the security of the eyes (*PA* II.13, 658b13–15). But the mouth is a part of living things which is for the sake of some different functions (*PA* III.1, 662a20–27). The mouth primarily exists to chew food and thus

[150] As the brain does for the sake of cooling, or blood does for the sake of nutrition. (See *PA* II.6–7)

[151] Gills function similarly.

[152] For an explicit analysis of Aristotle's explanation of respiration, see King (2001, 113–122).

digest it, but some animals also use their mouth for some special purpose in respect to their needs, for instance, a mouth can be used as an aid to respiration, a defensive weapon, and a speaking organ. Therefore, by demonstrating that the parts of living things exist for the sake of supporting some other parts, processes or activity, or for the sake of most basic functions, Aristotle establishes his final causal explanations of the parts of living things.

Besides the nutritive-reproductive capacity of the soul, there is also a capacity that all animals possess, namely, the capacity to perceive[153]. Aristotle supposes that it is the possession of perception that leads us to speak of living things as animals and not merely living things (*DA* II.2, 413b2–3). An animal is an animal in virtue of its perceptive part since the definitive characteristic of an animal is the possession of perception[154] (*PA* III.5, 666a34), and the exercise of perception or of thinking[155] is the final goal for all beings to which either of these pertains since these are best, and the final goal is what is best (*Somn* II, 455b23–25). Aristotle defines the life of animals by the capacity of perception, and defines the life of human beings by the capacity of thinking (*NE* IX. 9, 1170a16–19). He refers to the capacity of perception or thought as the essential characteristic of living beings, and thus he says that life seems to be essentially perceiving or thinking. In this way, the perception turns out to be the highest capacity of the non-human animals, so this is their final goal, and the end is also the best, thus the perception of animals is taken to be their final cause since perception is the final end or goal of animals.[156] Furthermore, Aristotle notices that some kinds of animals have behaviors which are to some extent similar to those of humans. For instance, ants are considered industrious since their various behaviors are related to gathering food, providing shelter, and promoting reproduction (*HA* IX.37, 622b19–25). Another example is spiders, as spiders are most accurate and skilled at weaving

[153] See e.g., *GA* I.23, 731a 30–4; *DA* II.2, 413b2; III.1, 425a8–10; III.12, 434b17–24; *Sens* I, 436b11; *Juv* I, 467b24–5; *Meta* I. 1, 980a27–8.

[154] See also Code (1997, 139).

[155] For animals, the exercise of perception is the final goal; while for human beings, the exercise of thinking is the final goal.

[156] At the most basic level in Aristotle's biology, the capacity of perception improves the practices and abilities of animals, especially in feeding and rearing its pups, so, it is closely related to the primary function of animals' nutritive-reproductive animal soul. Indeed, the function of a higher capacity of the soul does not diminish the importance of the primary and basic one, moreover, higher capacities result in more complex, social and intelligent behaviors in support of the basic process (*HA* VIII.1, 588b21–589a5; VIII.5, 596b20–23; IX.10, 615a24–25; IX.34, 620b10–11).

webs to survive and obtain food (*HA* IX.39, 623a8–15). Bees are also an example, as they have excellent diversity in their approach to activity and lifestyle (*HA* IX.40, 623b26–28). However, although some animals behave comparably to humans, Aristotle specifically points out that these non-human animals do not actually possess intellect in the sense that humans do, since non-human animals live merely by appearances and memories and they have little relevant experience, while humans live by art and reasoning[157]. Non-human animals do not have the capacity of deliberation, and so of discourse, inquiry and technology[158]. But meanwhile, Aristotle realizes that non-human animals are capable of highly advanced and complex practices for the benefit of their survival and reproduction (*Phys* II.8, 199a8–30). Non-human animals and plants do not have the capacity of deliberation, but they do have end-oriented activities, for they act for the sake of a final end. Their ends are determined by the capacity of their souls, which is independent of human activities and different from the ends of humans. Hence, non-human animals are actually focused on their own survival and reproduction, and their various activities are understood in terms of their capacities, even if they cannot deliberate. Accordingly, the activities of animals exist for the sake of their own survival and reproduction, and the exercise of perception is the final goal for all non-human animals[159].

According to the discussion above, the soul is a final cause of living things in Aristotle's biology, since the soul is the cause of living things being alive, and the body and parts of living things are organized for the soul. In Aristotle's biology, there are different kinds of souls in different levels of living things, with the higher living beings possessing more complex capacities and faculties of soul. Therefore, by identifying the soul as a final cause, Aristotle establishes a unified explanation in the field of biology.

---

[157] See e.g., *Meta* I.1, 980b27–28; *DA* II.10, 433a11–12; *Politics* VII.14, 1332b4–5.

[158] See e.g., *HA* IV.9, 536b1–3; Pol I.2, 1253a7–18 and I.5, 1254b23; *Phys* II.8, 199a20–22.

[159] According to Aristotle, a human being is for the sake of the good itself. Although it is impossible to define a universal good for the sake of which humans are, it is possible that the good, which all humans are for the sake of, exists (*NE* I.4, 1096b32–35; 1218b7–16). In fact, this issue belongs to Aristotle's ethical works; since my work is focusing on Aristotle's works of natural philosophy, I choose not to discuss so much on the final end of humans.

2.4.3 The Limitation of Final Causation in the Explanation of Some Parts of Biology

Having examined many explanations in Aristotle's biology based on the soul as a final cause, now we turn to investigate limitations with regard to the final cause in the explanation of some particular phenomena. Aristotle mentions three kinds of biological cases which are difficult to explain through the final cause, namely, incidental cases, some specific phenomena, and spontaneous generations.

The first kind of cases which are difficult to fit into final causal explanation are the incidental cases in living things. For instance, Aristotle observes the incidental functions of eyes[160] (*EE* VII.13, 1246a26–35). He shows that, due to the eye being an eye, one might use the eye both for seeing and for falsely seeing by squinting, but it is also possible to use the eye in an incidental way, for instance, if one sells or eats it. Moreover, there are also some other incidental cases in Aristotle's biological works, such as, the enormous horns of deer, the violent nature of the heron, beards and hair growth in general, the futile existence of the day fly, male nipples, the definite shape and nature of plants. All these examples are difficult to explain with the final cause, since we cannot find their end or purpose. It seems that the final ends or aims do not apply to these biological cases and we can merely say that these cases happen by incident. A large number of plants and animals' development and generation seems to be explained only by the appropriate season, climate, or environmental conditions.[161] For example, the change of seasons is related to the heat of the Sun, which then has different effects on the air and the earth, thus affecting the movement of plants and animals.[162]

Secondly, there are also some specific biological phenomena which cannot be explained by the final cause. For instance, Aristotle indicates that the location of the mouth in some big sea creatures is for the benefit of other animals' survival[163]

---

[160] See also Johnson (2005, 201–202) on incidental functions of organisms in Aristotle.

[161] These can be considered as instances of Aristotle's efficient causes, which I shall discuss in detail in chapter 3.

[162] Aristotle does not mention the final cause in the Sun's effect on the sublunary world.

[163] Balme (1972, note at 696b27) observes this special phenomenon in Aristotle's biology is 'a sarcastic rejection' of an overall final causal explanation in Aristotle, and he thinks this is evidence against Aristotle's view of final cause that animals are for the sake of their own survival and not for

(*PA*, IV.13, 696b23–30), which is contrary to his final causal explanation that living things exist for the sake of their own survival.[164] In Aristotle's observation, fishes display diversity in their mouths. In some animals, it is at the front end of the body and at the very extremity of the body, while in others, such as dolphins and sharks, it is placed on the under surface, so that these fishes turn on the back in order to take their food. Aristotle comments that the location of the mouth in these fishes provides a means of salvation for other animals, giving them the opportunity of escape during the time lost in the act of turning, since all fish with such mouths prey on living animals. Thus, it can be seen that the location of the mouth in sharks and dolphins and their turning over while feeding themselves provide a benefit to other animals which can escape more easily. This phenomenon is contrary to Aristotle's final causal explanation since these big sea creatures do not exist merely for themselves, but also for the survival of other creatures. This specific phenomenon cannot fit Aristotle's final cause explanations, and thus poses a challenge to certain interpretations of his final cause.

The third kind of case is the spontaneous generation of some living things.[165] We have discussed the final causal explanations of living beings' generation, namely, that living beings are generated based on the capacity of reproduction. Plants are generated through their seeds, which has the mix of male and female principles[166], while animals are generated through sexual reproduction. According to Aristotle, there are also some living things which are generated by spontaneous generation[167], for instance, the testaceous animals. In Aristotle's observation, the generation of testaceous animals is partly like and partly unlike the living things in other classes since they resemble plants when compared with animals, and they resemble animals when compared with plants[168]: in one sense it seems that they appear to come into being from semen but in another sense not so, and in one

---

the sake of other animals. See also Charles (2012, 17–18).

[164] For detailed discussion that living things are for the sake of their survival, see chapter 2.5.2.

[165] Some scholars are aware of the challenge of Aristotle's final causal explanation in biology that spontaneous generation cannot be explained by the final cause. See Gotthelf (1989, 185–188) and Lennox (1982, 219–238).

[166] For explicit statements about the reproduction of plants in Aristotle's biology, see the references in Sprague (1991, 221–229).

[167] On the notion of spontaneous generation in Aristotle, see Balme (1962, 92–98). On the biological methodology in Aristotle's theory of spontaneous generation, see Zwier (2018, 385–395).

[168] On the relation of the different spontaneously generated living things to Aristotle's hierarchical gradation of the natural world, see Lloyd (1998, 122–124).

sense they are generated spontaneously but in another sense they are generated from their own kind, or some of them in the latter way and others in the former (*GA* III.11, 761a15–31). Because testaceous animals resemble plants, there are few or no kinds of testaceous animals that come into being on land, such as snails and other kinds of animals, but in the ocean and similar waters, there are many testaceous animals in various forms. But such kinds of plants are hardly represented in the ocean and such places, all of these growing on the land. Since plants and testaceous animals are analogous, and in terms of liquid have more life-sustaining power than solids, and water having more life-sustaining powers than earth, the nature of testaceous animals is also very different from that of plants because the object of testaceous animals is to be in such a relation to water as plants are to earth, as if plants were shellfish on land and shellfish were aquatic plants. Therefore, testaceous animals in some ways function like plants, in other ways they function like animals, so they are similar to all other living things, and thus Aristotle considers this kind of generation as spontaneous generation, which is an exception to the normal reproduction process of living things. Aristotle concludes that all those living things which do not 'bud off' or sexually reproduce are spontaneously generated[169] (*GA*, III.11, 762a8–16). All living things which are generated spontaneously, whether in earth or water, manifestly come into being in connection with putrefaction and an admixture of rainwater, since when the sweetness is separated into the substance that is forming, the residue of the mixture takes the form of spontaneously generated living things, thus nothing is formed by putrefying, but by concocting, and putrefaction and the thing putrefied is merely a residue of that which is concocted.[170] It is clear that spontaneously generated living things come into being in relation to rottenness and the mixture of rain water. As a result, they come into being in a wide variety of environments, but cannot be made to come into being by any regular process, such as reproduction. It can be seen that these spontaneously generated living things do

[169] It should be noted that Aristotle recognizes the existence of spontaneous generation against the explanation of final cause. This view is explicitly examined by Gotthelf (1989, 185–190) who comments that the reason why Aristotle provides the explanation of final cause is that Aristotle does not believe the materials alone are capable of coming together to produce the form of living things, so the final cause must work, but the spontaneous generation of some living things conflicts with the explanation of final cause.

[170] This process of spontaneous generation is analogous to the process of art, since in the process of art, the artist removes the useless materials, while in the process of spontaneous generation, nature removes useless materials. (*GA*, III.11, 762a17–18)

not have the capacity of reproduction, hence they do not fit into the explanation of the final cause according to which living things exist for the sake of their reproduction.[171]

Therefore, concerning the fact that there are some cases that cannot be explained through the final cause, it is clear that Aristotle's final cause has a limited role in some parts of biology, thus the final cause cannot not ensure a unified explanation in the field of biology.

Accordingly, by identifying the soul as a final cause, Aristotle posits that there are different kinds of souls in different levels of living things, with the higher living beings possessing more complex capacities and faculties of soul, and therefore he establishes a unified explanation in the field of biology, However, although Aristotle supposes that there are different kinds of souls in different levels of living things, with the higher living beings possessing more complex capacities and faculties of soul, and he tries to establish a unified explanation in his biology based on the soul as a final cause, given the fact that there are three kinds of biological cases which cannot be explained by final causal explanation, it seems that final cause cannot not guarantee a unified explanation in the field of biology as a whole.

[171] And this is also the reason why this kind of generation is called spontaneous generation, in accordance with the notion of spontaneity developed in *Phys* II.4–8. For a defense of the consistency of the notion of spontaneity in *Phys* with *GA*, see Lennox (1982) and Balme (1962).