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THE PLACE OF THE SOUL: CARDIOCENTRISM AND ENTELECHISM

EL LUGAR DEL ALMA: CARDIOCENTRISMO Y ENTELEQUISMO

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Abstract: There is a long-standing debate among Aristotelians regarding the location of the soul. The traditional interpretation is that in most of the biological treatises, the soul is said to reside in the heart, the hottest part of the body. This theory is known as cardiocentrism. Conversely, when the philosopher writes a treatise specifically addressing the topic of the soul, i.e., *De An.*, he revises his view and argues for a soul that is the actuality of the entire body, with no specific location. This theory is known as entelechism. In this paper, we will assert that Aristotle maintained his cardiocentric approach in *De An.* and never abandoned the theory. Furthermore, we will attempt to demonstrate that cardiocentrism and entelechism are ultimately compatible and not mutually exclusive.

Keywords: entelechism, cardiocentrism, body, soul, heart.

Resumen: Existe un debate de larga data entre los especialistas en Aristóteles acerca de la localización del alma. La interpretación tradicional sostiene que, en la mayoría de los tratados biológicos, Aristóteles afirma que el alma reside en el corazón, la parte más caliente del cuerpo. Esta teoría es conocida como cardiocentrismo. Por el contrario, cuando el filósofo escribe un tratado dedicado específicamente al alma, es decir, el *De An.*, revisa su postura y defiende que el alma es la actualidad del cuerpo entero, sin una localización particular. Esta teoría se conoce como entelequismo. En este artículo, sostenemos que Aristóteles mantuvo su concepción cardiocéntrica en el *De An.* y nunca abandonó dicha teoría. Además, intentaremos demostrar que el cardiocentrismo y el entelequismo son, en última instancia, compatibles y no mutuamente excluyentes.

Palabras clave: entelequismo, cardiocentrismo, cuerpo, alma, corazón.

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1. *The role of the heart in Aristotelian biology*

In this first part, we will go over the role of the heart in Aristotelian biology. This is fundamental to understanding the foundations on which the entelechist view is based. Later, we will review entelechism through its two main advocates, namely, Nuyens and Ross. After that, the main objections to entelechism will be presented to demonstrate that it is, ultimately, untenable. Finally, we will attempt to prove that cardiocentrism and entelechism are still at play in *De An.* and that they are perfectly compatible within a hylomorphic approach to living beings.

The significance of the heart (καρδία) is well documented in both biological treatises and the *Parva Naturalia*. From a chronological perspective, Aristotle states that it is the first organ to develop in blooded animals (*Part. An.* 666a 10-11; *Gen. An.* 742b 2-3; *De Juv.* 468b 30-32)¹. The fact that the heart is the earliest organ to form during foetal development has a significant biological explanation: the heart is responsible for containing and circulating blood throughout the body (*Gen. An.* 726b 1-12). Consequently, it is not only the first in chronological terms but also first in importance (*Gen. An.* 762b 25-27; *Met.* 1035b 25-27). Aristotle describes it as «principle» (ἀρχή) in relation to the other organs (*Motu An.* 703a 14; *Gen. An.* 762b 27)². This is why the heart is regarded as the seat of the soul (*De Juv.* 467b 13-16; *Motu An.* 703a 14)³.

Not only is the importance of the heart well attested in the sources, but so is its function. In various passages, it is described as the source of heat (θερμός), the distinctive sign of living animals (*Part. An.* 670a 24)⁴. Without it, life cannot exist. Additionally, as the hottest part of the body, it is also the one that requires the most cooling (*De An.* 420b 20-26). It also functions as a receptacle for blood (αἷμα), another essential element for life (*Part. An.* 665b 10-13). The form and structure of the heart are explained in relation to its function: since its primary task is to receive, hold, and pump blood, and since blood is fluid, the heart must resemble a vessel. This, in turn, explains its position. Since it is the most crucial organ upon which all life depends, it must be protected; that is why it is located centrally, in the upper part of the body, a position of «primacy and governance» (ἀρχικὴν) (*Part. An.* 665b

¹ All the translations from the biological works, the *Parv. Nat.* and *De An.* are taken from the Loeb edition. The translation of *Motu. An.* is from Primavesi 2023, and *Met.* from Ross 1991. The translations from French and Spanish are our own.

² For further elaboration on the idea of the heart as first organ and responsible for distributing life to the whole body, see Rapp 2022, pp. 301-310.

³ Gregoric 2020, posits that there are biological and metaphysical reasons for the soul to be located in the heart. Rodríguez 2013, p. 129, traces the idea of the heart as seat of the soul back to Empedocles, from whom Aristotle would have taken it. For a historical review of the development of cardiocentric and cerebrocentric theories, see Smith 2013.

⁴ See also, O'Rourke 2018, pp. 16-18.

18-21). Aristotle also mentions another observation that leads him to see the heart as the centre of life: the blood vessels do not pass through the heart but rather emerge from it. Thus, the heart acts as the source and origin of the blood vessels, not merely as a passage (*Part. An.* 665b 16-17).

Furthermore, the καρδία is responsible for many other operations. For example, the philosopher notes that each sense has its own specific object and specific function. The auditory sense works with sounds and is tasked with hearing; the visual sense manages visual perception and deals with colours, and so on (*De Somn.* 455a 13-16). However, these are simply individual inputs from the external world. Something within the soul is necessary to unify these stimuli into a single perception (*De Sens.* 449a 3-10; *De Somn.* 455a 16-18). That role falls to the «common sense» (κοινὴ αἴσθησις; *De Juv.* 467b 28)⁵, which integrates information from different senses into one common object; without it, the whiteness, shape, texture, and smell of Aquiles the white poodle would remain as separate pieces of information, preventing us from combining them to recognise the dog they originate from⁶. This vital capacity is housed in the heart; it is there that perceptual sensations are organised, assimilated, and unified (*De Somn.* 456a 4-6)⁷.

In another passage, Aristotle suggests that the heart functions as the origin of motion. In *Motu An.* 8, the philosopher inquires about «that which primarily moves the animal» (τὸ δὲ κινεῖν πρῶτον τὸ ζῶιον) (*Motu An.* 702a 21). He approaches the subject using the example of a hand moving a stick. The origin of that motion could be in the stick itself or the hand that moves it (*Motu An.* 702a 32-34). After a series of observations, he concludes that the cause of the movement is in neither of them; it is in the soul (*Motu An.* 702b 1-3). In the subsequent chapter, he states clearly that «the origin [of movement] for some animals is in the heart» (ἐπεὶ δ' ἡ ἀρχὴ τοῖς μὲν ἐν τῇ καρδίᾳ) (*Motu An.* 703a 14)⁸. Therefore, although the movement is caused by the soul, it uses the heart as the instrument through which the soul moves the entire living being. And it does this by «pushing and pulling» (ὥσιν καὶ ἔλξιν), which explains the heart's capability of «being increased and of being contracted» (δύνασθαι καὶ συστέλλεσθαι) (*Motu An.* 703a 19-20)⁹.

There remains one specific function of the heart: its role in nutritive life and perceptual sensation. In *De Juv.* Aristotle briefly addresses these topics:

⁵ This expression is used several times in different texts. See, for example, *De Mem.* 450a 10-11; *De An.* 425a 27; *De Mem.* 450a 10; *Part. An.* 686a 31. Sometimes Aristotle uses δύναμις instead of αἴσθησις to refer to the same capacity (e.g. *De Somn.* 455a 16-17).

⁶ This operation is one of many that are performed by the common sense. For a detailed study of the other functions, see Gregoric 2007, especially chapter III.

⁷ Gregoric 2007, pp. 7-9.

⁸ For a more detailed study of the role of the heart as the origin of locomotion, see Frampton 1991.

⁹ For this, see also Smith 2013, p. 8.

We have stated already in our treatise *On the Parts of Animals* that the heart is the source of the veins; and that, in sanguineous animals, the blood is the ultimate nutriment from which the parts are developed. Now it is clear that one function in respect of food is served by the mouth and another by the stomach; but the heart is the supreme power, and contributes the final step. So in sanguineous animals the source of both sensitive and nutritive soul must lie in the heart; for the functions of the other parts in respect of food are for the sake of the heart's function; for the dominant force must be directed towards the final aim, as is the physician's relation to health, and not reside in subordinate processes. Moreover, in all sanguineous animals the supreme organ of the sense-faculties lies in the heart; for in this part must lie the common sensorium of all the sense-organs.

ἡ δὲ καρδία ὅτι ἐστὶν ἀρχή, τῶν φλεβῶν ἐν τοῖς περὶ τὰ μέρη τῶν ζώων εἴρηται πρότερον· καὶ ὅτι τὸ αἷμα τοῖς ἐναίμοις ἐστὶ τελευταία τροφή, ἐξ οὗ γίνεται τὰ μόρια. φανερόν τοίνυν ὅτι μίαν μὲν τινα ἐργασίαν ἡ τοῦ στόματος λειτουργεῖ δύναμις, ἑτέραν δ' ἡ τῆς κοιλίας, περὶ τὴν τροφήν· ἡ δὲ καρδία κυριωτάτη, καὶ τὸ τέλος ἐπιτίθησιν. ὥστ' ἀνάγκη καὶ τῆς αἰσθητικῆς καὶ τῆς θρεπτικῆς ψυχῆς ἐν τῇ καρδίᾳ τὴν ἀρχὴν εἶναι τοῖς ἐναίμοις· τὰ γὰρ τῶν ἄλλων μορίων ἔργα περὶ τὴν τροφήν τοῦ ταύτης ἔργου χάριν ἐστὶ· δεῖ μὲν γὰρ τὸ κύριον πρὸς τὸ οὗ ἕνεκα διατελεῖν, ἀλλ' οὐκ ἐν τοῖς τούτου ἕνεκα, οἷον ἰατρὸς πρὸς τὴν ὑγίειαν. ἀλλὰ μὴν τό γε κύριον τῶν αἰσθήσεων ἐν ταύτῃ τοῖς ἐναίμοις πᾶσιν· ἐν τούτῳ γὰρ ἀναγκαῖον εἶναι τὸ πάντων τῶν αἰσθητηρίων κοινὸν αἰσθητήριον (*De Juv.* 468b 32-469a 13).

The initial remarks regarding the relationship between the heart, veins, and blood vessels are common in these treatises. The interesting part is the heart's role in nourishment. Aristotle states that while the mouth and stomach are important—the mouth as the cavity through which food enters the body and the stomach as the receiver that processes it—another part of the body also has a significant role, described as a «supreme power» (κυριωτάτη): the heart. This passage might lead us to believe that this supreme power is life itself. As the principle and command centre for life, the power exercised by the heart could very well be its role as the foundation for all functions in living beings. However, the mention of blood suggests that the role discussed here, which is the final aim, relates to nourishment. The heart

is responsible for pumping the nutritive fuel to every part of the body through the veins and blood vessels: «Within an animal's body nourishment undergoes a series of transformations and is finally turned into blood. As blood it is distributed to all regions of the body, thus contributing to the growth and preservation of the bodily parts»¹⁰. It is for this final aim that all other parts perform their functions. In the final part of the passage, the philosopher restates an idea we have already discussed—namely, that the heart also functions as the centre of perceptual life¹¹.

In *De An.*, although not a biological treatise, Aristotle mentions the heart several times. In *De An.* 403a 31, he explains anger's bodily process as a surge of blood and heat around the heart. In *De An.* 408b 8, the philosopher explains that thinking, being an affection (πάθη), must produce a change in the body, and this ought to happen either in the heart or elsewhere. The fact that his first option is the heart reinforces the idea that, in his mind, this organ is one of the most important, if not the most. Remarks like this are crucial for understanding that cardiocentrism still influences *De An.* Later, in *De An.* 420b 25-26, he mentions that the organ of respiration is the throat, through which air reaches the lungs. This, in turn, responds to the heart's need for respiration. This partially explains why land animals are hotter than birds or fish. Finally, in *De An.* 432b 31, the philosopher inquires as to what produces locative movement. Among the possibilities is the intellect. However, he dismisses this possibility because that capacity only theorises about pleasant and fearful things. It is the heart that is moved by such things, not the intellect. These are all the explicit mentions of the heart in *De An.* As we can see, there is no direct attachment of the soul to any specific place within the body.

Nonetheless, there are other implicit or indirect references in this text. In *De An.* 408b 23-28, a famous and much-discussed passage, Aristotle mentions that when the intellectual activity declines, it is not because the soul has been affected in some way (by age in this case), but because «that in which the soul resides» (ἀλλ' ἐν ᾧ) (*De An.* 408b 23-24) has. He continues: «Thus, the power of thought and speculation decays because something else within perishes, but itself it is unaffected» (καὶ τὸ νοεῖν δὴ καὶ τὸ θεωρεῖν μαραίνεται ἄλλου τινὸς ἔσω φθειρομένου, αὐτὸ δὲ ἀπαθές ἐστιν) (*De An.* 408b 25-26). This passage is notable for two reasons: firstly, because it presents one of the attributes of the intellect, namely being «unaffected», and secondly, because it states that the soul has a place of residence. The first point, as fascinating as it is, falls outside the scope of this article. The second, however, is of much greater interest. Aristotle explicitly states that the soul resides somewhere. At first

¹⁰ Rapp 2022, p. 277. This is mentioned several times by Aristotle (e.g. *Gen. An.* 726b 1-12; *Part. An.* 678a 6-12).

¹¹ For a more detailed account of the role and importance of the heart in the biological treatises and some of the *Parva Naturalia*, see Rapp 2022, pp. 269-289.

glance, one might ask how the philosopher can assign a location to an immaterial entity. If immaterial items, by definition, lack matter and occupy no space, it seems unlikely they can be located here or there. Nonetheless, this is a challenge for us, not for him. In the hylomorphic framework of living beings, Aristotle sees no issue with material and immaterial elements interacting and functioning together. For this to occur, there must be some form of connection between them in the philosopher's view. Therefore, claiming that the soul resides in a specific location does not pose a problem for him. The intriguing question is what precisely he means by *τινὸς ἔσω*. There are two potential candidates for this implicit reference: first, if we take the previous *ἀλλ' ἐν ᾧ* from 408b 23-24, he could be referring to the body as a whole. However, the next line, as mentioned, he specifies his remark and talks of a *τινὸς ἔσω*, which makes clear the place in question is internal. The adverb *ἔσω*, usually translated as «into» or «within», suggests that Aristotle alludes here to something different from the body—indeed, something «within» the body. According to previous biological treatises, this must be the heart. Hence, this passage implies that intellectual activity declines not when the body as a whole is affected by age, but when this internal structure suffers from such effects, be they due to age or other factors. If our interpretation is correct¹², these two lines could imply that there is a physical location for the soul within *De An.*

Let us examine other implicit references. In *De An.* 423b 23, it is stated that, aside from the sense of touch, sensation does not occur when the organ is in direct contact with the corresponding organ. The example used here is seeing. If you place an object directly against the eyeball, sight will not occur. Aristotle explains this by saying, «that which is perceptive of what is touched is within» (*ἢ καὶ δῆλον ὅτι ἐντὸς τὸ τοῦ ἀπτοῦ αἰσθητικόν*) (*De An.* 423b 23-24). In other words, the process that interprets sensory input — in this case, seeing — is something internal. As we previously discussed, that is one of the functions of the heart¹³. Another reference related to perception appears at 431a 18. Here, the philosopher states that each sense has its own specific object, but there is something else that «distinguishes between sweet and hot» (*ἐπικρίνει τί διαφέρει γλυκὺ καὶ θερμόν*) (*De An.* 431a 21), and whatever this is, has already been explained earlier. This is a clear, though not explicit, allusion to the common sense, which is closely linked to the heart¹⁴.

Later, in *De An.* 433b19-27, Aristotle discusses how movement arises in animals and concludes that it is produced by desire. An interesting point is that what causes movement driven by appetite is an «instrument» (*ὄργανον*) belonging to «the physical sphere» (*σωματικόν*), and it is a function «common to body and soul» (*κοινοῖς σώματος καὶ ψυχῆς*).

¹² Boeri 2010, pp. LXXII-LXXVIII presents a similar interpretation of this passage.

¹³ A similar observation is made later in *De An.* 426b 16.

¹⁴ For a detailed analysis of the common sense and its relation to the senses, as well as the role of the heart in these processes, see Boeri 2010, pp. CXLVII-CLXV.

The heart is the only candidate here. It is undoubtedly an instrument of the soul, as previously stated; it belongs to the body and enables animals to perform activities shared by both their psychic and bodily aspects. Although the heart is not explicitly mentioned, this is a clear reference to it and its role as common sense. Consequently, even though these passages do not specify a particular location, they at least suggest that the heart still plays a significant role in *De An.* and that its importance should not be overlooked¹⁵.

These are generally the most significant passages concerning the heart and its role as the centre of life, movement, nutritive life, sensitive life, and perceptual faculties.

2. *Entelechism in De Anima*

The two primary defenders of entelechism are François Nuyens and W. D. Ross. In this second section, we will outline the arguments they present. The first defence of entelechism appeared in Nuyens' 1948 monograph *L'évolution de la psychologie d'Aristote*. This work is well known for proposing an explanation of the order in which Aristotle's work must have been written. Nuyens' main argument is that Aristotle shifted from being a Platonic philosopher rooted in the Academia to a mature thinker who distanced himself from these ideas and established a metaphysical framework that enabled him to develop his own philosophy, particularly on issues concerning the psychophysical nature of living beings¹⁶. Thus, Aristotle began as an enthusiastic Platonist and gradually became the renowned philosopher we recognise today. This thesis is now known as the «developmentalist approach» to the philosopher's intellectual evolution. It was highly influential for many decades, with numerous scholars adopting this perspective to understand the composition of the Aristotelian corpus. It is within this framework that entelechism was first introduced.

The most direct assertion in this regard appeared as follows: «the conception of an incorporeal soul might perhaps bring to mind the *De Anima*, but the idea that the soul resides in a well-defined part of the body is absolutely incompatible with the concept of ἐντελέχεια»¹⁷. To understand Nuyens' line of thought, we need to review some details of his developmental theory. The Belgian scholar proposed a three-stage process of philosophical

¹⁵ Tracy 1983, p. 327: “Thus the explicit and implicit references to the heart in DA, though relatively few and introduced incidentally, indicate clearly enough that Aristotle is thinking of the heart also in this work as the central organ of the nutritive and sensitive life, a doctrine developed explicitly and in detail in the *PN* and the biological works”.

¹⁶ Some would say that developmentalism was first proposed by Jaeger. However, his approach adopted a broader philosophical framework for tracing the development of Aristotle's philosophy, whereas Nuyens was the first to take the philosopher's psychology as the main criterion for dividing those stages.

¹⁷ Nuyens 1973, p. 165. See also Block 1961, p. 50-51; Tracy 1983, p. 321.

growth. The first stage displays clear Platonist ideas, such as those seen in the remaining fragments of the *Eudemus*. The middle stage considers the biological works (excluding *Gen. An.*) and the *Parv. Nat.* (excluding *De Sen.* and *De Mem.*). During this second stage, the philosopher began to distance himself from Plato and introduced his own ideas¹⁸. This period is characterised by a mechanistic instrumentalism in which the soul operates through the body to perform its activities¹⁹. The main organ for this purpose, as previously noted, is the heart. The final stage reflects the more philosophically mature Aristotle. Nuyens recognises *De An.*, along with *Gen. An.*, as belonging to this period²⁰. It is in this work that the philosopher introduceshylomorphism, where body and soul do not operate as separate substances but form a single entity, namely the living being. In *De An.* 2.1, the soul appears as «actuality» (ἐντελέχεια) of the entire body. From Nuyens' perspective, this indicates that Aristotle abandoned his earlier cardiocentric model in favour of a framework in which the heart no longer plays a central role, or at least not as the seat of the soul as he previously argued in the biological treatises. Conversely, the soul is present throughout the entire body as a complete unity and actuality, without occupying a specific location or organ in which it primarily rests and from which it commands the rest of the organism. Therefore, it is the role of the heart and its relationship with the soul that Nuyens considers to be the pivotal point, which leads him to state that cardiocentrism is incompatible with the conception of the soul as the form and actuality of the body. For the Belgian scholar, this distinction marks the shift from the middle to the later periods of Aristotle's philosophy, namely the rejection of the cardiocentric instrumentalism and the adoption of entelechism or hylomorphism. Hence, in his view, a cardiocentric model and an entelechist model are entirely incompatible since they provide causal explanations for movement, nourishment, growth, and life in general that cannot be reconciled. As observed, Nuyens' proposal largely rests on his developmental theory, which holds that the philosopher transitioned from being a Platonist student to a mature thinker with his own metaphysical ideas about the world and its living beings²¹.

Many renowned scholars followed Nuyens and the idea of a philosopher who matures as he distances himself from his early teacher, displaying various stages of philosophical development marked by the rejection and acceptance of different theories. The most famous among them is W. D. Ross²². In 1948, in Ross's edition of the *Parva Naturalia*, he wrote an introduction to the various works being edited and discussed several topics, including the

¹⁸ For this chronology, see Nuyens 1973, chapter 4.

¹⁹ Rapp 2023, pp. 21-22.

²⁰ Nuyens 1973, pp. 237-239, Ross 1960, p. 4.

²¹ Tracy 1983, pp. 323.

²² Ross 1960, p. 3; 1961, p. 8. Recognises, with Nuyens, three stages: early, middle and late periods. Other renowned academics such as Mansion, Drosaart, Louis, Barbotin, and Gauthier followed Nuyens' chronological proposal.

importance and role of the heart in these late Aristotelian texts. From the very beginning, Ross admits to following Nuyens in his developmentalist approach²³. Regarding the middle period, he states: «The soul is no longer the prisoner of the body, but it is still a distinct entity which inhabits the body, and has its seat in a particular organ, the heart»²⁴. On the other hand, he describes the third stage using the heart as a criterion: «in contrast with the importance attached to the heart in the biological works, in none of the passages of the *De Anima* in which the heart is mentioned (403a 31, 408b 8, 420b 26, 432b 31) is any primary importance assigned to it»²⁵. Furthermore, not only does the heart play a minor role, if any at all, but the soul, in Ross's view, offers a better explanation for how living beings, especially animals, live their lives and perform their specific functions. This would be the distinctive feature of *De An.* and the mature stage of Aristotle's hylomorphism: «we hear no longer of a location of the soul in any one part of the body, but it is described as the *ἐντελέχεια*, the principle of structure or organisation of the whole body»²⁶. Nevertheless, as we will examine later, there are passages in *Parv. Nat.* that support a cardiocentric view of living beings. According to Nuyens, these texts (*De Sen.* and *De Mem.*) were written after *De An.*, so Ross faces the challenge of explaining these apparent inconsistencies. The solution is neither elegant nor effective. Contrary to Nuyens, Ross suggests that these texts were written conveniently before *De An.*, or at least before certain parts of it²⁷. This, as expected, leads to the awkward implication that *De An.* was composed at different stages of Aristotle's development²⁸. Thus, the chapters dealing with the definition of the soul as *ἐντελέχεια* would have been written after the books of *Parv. Nat.* that advocate the cardiocentric model (especially *De Juv.* and *De Resp.*)²⁹. The other parts of *De An.*, namely, book 1 and some sections of book 3, must have been written prior to *De An.* 2.1³⁰. As we will see later, this approach creates many issues. For example, there is clear evidence that some of the treatises of *Parv. Nat.* were clearly written after *De An.*, and in these texts, the heart still plays a central role. The next section will explore some of these problems.

²³ Ross 1970, pp. 3-8. Although he follows Nuyens, in another text Ross traces the developmentalist approach to Thomas Case, Professor of Moral and Political Philosophy at Oxford from 1894 to 1904. For this, see Ross 1960, pp. 1-2.

²⁴ Ross 1960, pp. 3-4.

²⁵ Ross 1970, pp. 7-8.

²⁶ Ross 1970, p. 7. Ross discusses the possibility of Aristotle using «actuality» here in a different sense than in other texts, but he ultimately concludes that it is not the case. Ross 1961, pp. 10-12.

²⁷ Rapp 2023, p. 22.

²⁸ This would explain why in *De An.* 1 there is no mention of the soul as actuality of the body. Cf. Ross 1960, p. 4.

²⁹ Ross 1970, pp. 7-8.

³⁰ Ross 1961, pp. 8-10.

3. *Entelechism vs cardiocentrism*

As previously noted, developmentalism was highly influential for many decades, and numerous scholars considered it the definitive method to unify the entire corpus aristotelicum. However, this issue has recently gained the interest of some scholars. The key question remains how to reconcile the apparent contradiction between the supposed instrumentalist or cardiocentric perspective of the middle period, as reflected in some of the biological works and the *Parv. Nat.*, and the more mature hylomorphic view of the soul as the form of the body, as it appears in *De An.* 2.1.

Nuyens and Ross start from the axiological idea that cardiocentrism and entelechism are incompatible. However, some have argued that there is no contradiction in emphasising «a particular bodily organ above the others and single it out as the source of those activities whereby the body lives»³¹. Before exploring specific passages from the scientific texts, there is textual evidence that allows us to draw a general picture that makes entelechism and cardiocentrism compatible, which can be found in *Met.*:

Therefore the parts which are of the nature of matter and into which as its matter a thing is divided, are posterior; but those which are parts of the formula, and of the substance according to its formula, are prior, either all or some of them. And since the soul of animals (for this is the substance of living beings) is their substance according to the formula, i.e. the form and the essence of a body of a certain kind (at least we shall define each part, if we define it well, not without reference to its function, and this cannot belong to it without perception), therefore the parts of soul are prior, either all or some of them, to the concrete animal, and similarly in each case of a concrete whole; and the body and its parts are posterior to this its substance, and it is not the substance but the concrete thing that is divided into these parts as its matter [...] Some parts are neither prior nor posterior to the whole, i.e. those which are most important and in which the formula, i.e. the substance, is immediately present, e.g. perhaps the heart or the brain; for it does not matter which of the two has this quality.

ὥσθ' ὅσα μὲν μέρη ὡς ὕλη καὶ εἰς ἃ διαιρεῖται ὡς ὕλην, ὕστερα: ὅσα δὲ ὡς τοῦ λόγου καὶ τῆς οὐσίας τῆς κατὰ τὸν λόγον, πρότερα ἢ πάντα ἢ ἓν.

³¹ Block 1961, p. 52.

ἐπεὶ δὲ ἡ τῶν ζώων ψυχὴ (τοῦτο γὰρ οὐσία τοῦ ἐμψύχου) ἢ κατὰ τὸν λόγον οὐσία καὶ τὸ εἶδος καὶ τὸ τί ἦν εἶναι τῷ τοιῷδε σώματι (ἕκαστον γοῦν τὸ μέρος ἐὰν ὀρίζεται καλῶς, οὐκ ἄνευ τοῦ ἔργου ὀριεῖται, ὃ οὐχ ὑπάρξει ἄνευ αἰσθήσεως), ὥστε τὰ ταύτης μέρη πρότερα ἢ πάντα ἢ ἓν τῷ συνόλου ζώου, καὶ καθ' ἕκαστον δὴ ὁμοίως, τὸ δὲ σῶμα καὶ τὰ τούτου μόρια ὕστερα ταύτης τῆς οὐσίας, καὶ διαιρεῖται εἰς ταῦτα ὡς εἰς ὕλην οὐχ ἢ οὐσία ἀλλὰ τὸ σύνολον, τοῦ μὲν οὖν συνόλου πρότερα ταῦτ' ἔστιν ὥς, ἔστι δ' ὡς οὐ (οὐδὲ γὰρ εἶναι δύναται χωριζόμενα: οὐ γὰρ ὁ πάντως ἔχων δάκτυλος ζώου, ἀλλ' ὁμώνυμος ὁ τεθνεώς): ἓν δὲ ἅμα, ὅσα κύρια καὶ ἐν ᾧ πρῶτον ὁ λόγος καὶ ἡ οὐσία, οἷον εἰ τοῦτο καρδία ἢ ἐγκέφαλος: διαφέρει γὰρ οὐθὲν πότερον τοιοῦτον (*Met.* 7.10, 1035b 11-27).

In this section of *Met.*, the philosopher inquires whether the parts of the form are prior to the material or not. Regardless of his answer to this question, there are two notable points in this passage. First, the soul is described as the form and essence of a body of a certain kind. The similarity with the definitions of *De An.* 2.1 is clear. Second, in response to this enquiry, Aristotle mentions that some parts, given their importance, are neither prior nor posterior but are simultaneous with the substance; without them, it could not exist. These parts are the most important parts of the substance, and he suggests two possibilities: either the heart or the brain. As expected, he does not commit to either in this passage³². However, the fact that the heart is one of the main contenders allows us to infer that he had his cardiocentric theory in mind, which, according to developmentalists, is characteristic of the middle period. Thus, in a few lines, Aristotle refers to the soul as the form of the body and attributes a primary role to the heart in living beings, without mentioning any conflicts or considerations. In his view, it seems that entelechism (or a certain form of it) and cardiocentrism do not exclude each other³³. Furthermore, this passage can be read alongside another in *Met.*, which discusses the heart as a principle.

We call an origin that part of a thing from which one would start first, e.g. [...] that from which (as an immanent part) a thing first arises, e.g. as the keel of a ship and the foundation of a house, while in animals some suppose the heart, others the brain, others some other part, to be of this nature.

³² Rapp 2022, p. 270, mentions that, since the aim of the passage lies in a more abstract discussion, the philosopher does not need to commit here to any of these options.

³³ Many scholars cite this passage of *Met.* and arrive at the same conclusion. See, for example, Tracy, 1983, pp. 329, 333-334; Rapp 2023, p. 24.

ἀρχὴ λέγεται ἢ μὲν ὅθεν ἂν τις τοῦ πράγματος κινηθεῖται πρῶτον [...] ἢ δὲ ὅθεν πρῶτον γίγνεται ἐνυπάρχοντος, οἷον ὡς πλοίου τρόπις καὶ οἰκίας θεμέλιος, καὶ τῶν ζώων οἱ μὲν καρδίαν οἱ δὲ ἐγκέφαλον οἱ δ' ὅτι ἂν τύχῃσι τοιοῦτον ὑπολαμβάνουσιν (*Met.* 5.1, 1013a 1-7).

Here, the heart is regarded as a principle (ἀρχή), that is, an «immanent part»³⁴ of an object without which the substance could not exist. This observation might refer to (a) the heart as the first organ to develop or (b) the heart as the most vital organ of the body. Based on the evidence presented above, we believe that both are correct. The heart is ἀρχή both chronologically and as the primary bodily organ. Such emphasis on a specific part of the body could serve as a «decisive theoretical device for accommodating Aristotle's cardiocentric tenets within a hylomorphic framework»³⁵.

Another example similar to this can be found in *Gen. An.* Let us remember that, given its commitment to hylomorphism, developmentalists attribute this work to the last period, along with the *De An.* Therefore, we should expect there a display of entelechism rather than cardiocentrism³⁶. The passage goes:

Thus, first of all there must of necessity exist some part in which the principle of movement resides (for of course this is a part of the End, and the supreme controlling part of it); after that comes the animal as a whole, i.e., the End; third and last of all come the parts which serve these as instruments for various employments. If it is true, then, that there is a part of this kind—a part which contains the first principle and the End of the animal's whole nature—which must of necessity be present in an animal, then this part must of necessity be formed first of all—formed first, *qua* activating, though formed along with the whole creature, *qua* being a part of the End. Thus, those instrumental parts which are in their nature generative must always be there themselves prior to the rest, because they are *for the sake of* something else, as being a first principle.

³⁴ Rapp 2022, p. 270.

³⁵ Rapp 2022, p. 271.

³⁶ Grene 1963, pp. 36-37. Rapp 2022, pp. 276-279, poses that hylomorphism is observable, for example, in the role played by males and females in reproduction. For a recent discussion of this widely accepted model, especially about the role of females, see Connell 2022.

πρῶτον μὲν ὑπάρχειν ἀναγκαῖόν τι μόριον ἐν ᾧ ἡ ἀρχὴ τῆς κινήσεως (καὶ γὰρ εὐθὺς τοῦτο τὸ μόριον ἐστὶ τοῦ τέλους ἐν καὶ κυριώτατον), ἔπειτα μετὰ τοῦτο τὸ ὅλον καὶ τὸ τέλος, τρίτον δὲ καὶ τελευταῖον τὰ ὀργανικὰ τούτοις μέρη πρὸς ἐνίας χρήσεις. ὥστ' εἴ τι τοιοῦτόν ἐστιν ὅπερ ἀναγκαῖον ὑπάρχειν ἐν τοῖς ζώοις, τὸ πάσης ἔχον τῆς φύσεως ἀρχὴν καὶ τέλος, τοῦτο γίγνεσθαι πρῶτον ἀναγκαῖον, ἧ μὲν κινητικὸν πρῶτον, ἧ δὲ μόριον τοῦ τέλους μετὰ τοῦ ὅλου. ὥστε τῶν μορίων τῶν ὀργανικῶν ὅσα μὲν ἐστὶ γεννητικὰ τὴν φύσιν, ἀεὶ πρότερον δεῖ ὑπάρχειν αὐτά (ἄλλου γὰρ ἕνεκά ἐστιν ὡς ἀρχή) (*Gen. An.* 742a 33-742b 6).

The passage begins by stating that there is a principle of movement, which exists «in some part» (τι μόριον). As previously discussed, this principle of movement is the soul (*Motu An.* 8, 702b 1-3). The part in which it resides is none other than the heart (*Motu An.* 10, 703a 14). This is confirmed by the subsequent observation that this residing part is the first to be formed, namely the heart. From this, it can be observed that, regarding the role of the soul in movement and its position within the body, there is little difference between *Motu An.*, a text from the middle stage characterised by instrumentalism, and *Gen An.*, a more mature work; in both, the soul remains the origin of movement and resides in the heart. Therefore, we see hylomorphism and cardiocentrism present together in the same passage. Some might argue, attempting to support developmentalism, that different parts of *Gen An.* were written at different stages of Aristotle's philosophical development. However, this is not the case here. These lines belong to the same chapter (i.e., scroll), rendering that claim invalid. This passage, along with the excerpt from *Met.*, provides enough evidence to consider our thesis as plausible.

We could cite numerous passages that could be used to weaken different aspects of the developmentalist thesis—that Aristotle abandoned cardiocentrism in *De An.* in favour of entelechism. However, *Parv. Nat.* offers a passage containing clear evidence to refute it. In *De Juv.*, a text developmentalists regard as earlier than *De An.*, there is a passage that addresses the issue, providing definitive evidence.

In another treatise we have given a detailed account of the soul, and while it is clear that its essence cannot be corporeal, yet it is equally clear that it resides in some part of the body which is among those which have control over the rest.

ἐπεὶ δὲ περὶ ψυχῆς ἐν ἑτέροις διώρισται, καὶ δῆλον ὅτι οὐχ οἷόν τ' εἶναι
σῶμα τὴν οὐσίαν αὐτῆς, ἀλλ' ὅμως ὅτι γ' ἐν τινι τοῦ σώματος ὑπάρχει
μορίῳ φανερόν, καὶ ἐν τούτῳ τινὶ τῶν ἐχόντων δύναμιν ἐν τοῖς μορίοις (*De*
Juv. 467b 13-17).

The treatise central to the discussion of the soul is *De An.* In all other works mentioning the soul, it is treated only incidentally and in relation to the topic at hand. The treatise referred to in the cited lines must, therefore, be *De An.* It then clearly states that the soul, although immaterial, «resides in some part of the body». The language appears unequivocal; the soul has a definite location within the body. Lastly, it indicates that the area where this residence occurs is the same area that exercises control over the entire body. There is no doubt that the organ in question is the heart. Consequently, these lines lead us to conclude that, first, given the backwards reference, at least this chapter was composed after *De An.*, therefore, committed to hylomorphism; second, that the soul is immaterial; third, that it resides within a material part of the body; and fourth, that this part, which serves as the residence, is the controlling one over the rest, namely the heart, thus maintaining the instrumental language of the so-called middle period. This implies that neither instrumentalism nor cardiocentrism is, in the philosopher's view, incompatible with hylomorphism³⁷. After this decisive passage, no further evidence appears necessary to demonstrate that a form of strong entelechism, such as the one displayed by developmentalists, is flawed.

4. *Cardiocentric hylomorphism*

Our aim was to demonstrate that Aristotle consistently defended cardiocentrism and that this theory remained influential in *De An.* The passages from *De Juv.* and *Gen. An.* sufficiently support the validity of our hypothesis. Nonetheless, two issues need to be addressed: first, the question of how an immaterial entity, such as the soul, can reside within a clearly defined material location; and second, since the two theories are not mutually exclusive, how they function together. Ross and Nuyens rightly assert that in *De An.*, the soul is the substantial form of the entire body; however, they interpret this as contradictory to the view that it is mainly located in a specific part. How, then, can the soul be present in other

³⁷ Upon examining this and other passages, several scholars arrive at a similar conclusion. For this, see: Gregoric 2020; Rapp 2022, 2023; Tracy 1983; Block 1961; Hardie 1964; Lloyd 1992.

parts of the body that are different from the heart? In this final section, we will briefly examine these two issues.

Let us consider the first issue. How can the soul, being immaterial, have a specific locative residence? While this presents a problem for us, Aristotle appears to have faced no such difficulty. In *Motu An.* he writes:

But it is necessary that the thing which moves both things is <one>, and that is the soul, which is different from a magnitude of that sort, but is in it.

ἀλλὰ τὸ κινεῖν ἄμφω ἀναγκαῖον <ἐν> εἶναι, τοῦτο δὲ ἐστὶν ἡ ψυχὴ, ἕτερον μὲν οὖσα τοῦ μεγέθους τοῦ τοιούτου, ἐν τούτῳ δ' οὖσα (*Motu An.* 703a 2-3).

In this case, the thing that moves others is the soul. It clearly states that it is not a magnitude (aligning with the passage from *De Juv.*), but «is in it» (ἐν τούτῳ δ' οὖσα), meaning that while not being a material part of the body, the soul is in some unspecified manner «in» the body. The use of the preposition ἐν does not appear to permit any further interpretation. Some might argue that this passage belongs to the instrumental period, which could explain the interaction between two items different in nature. However, such remarks can also be found in *De An.*, a text from the later, hylomorphic, phase of the philosopher's development. In the first chapter, he lays out the questions he will explore in the treatise: the nature of the soul, the proper way to define it, its interaction with the body, and so forth. Regarding the latter, discussing the best way to understand affections, he states:

But the natural philosopher and the logician will in every case offer different definitions, e.g., in answer to the question what is anger. The latter will call it a craving for retaliation, or something of the sort; the former will describe it as a surging of the blood and heat around the heart. The one is describing the matter, the other the form or formula of the essence. For what he states is the formula of the thing, and if it is to exist, it must appear in appropriate matter.

διαφερόντως δ' ἂν ὀρίσαιντο ὁ φυσικὸς [τε] καὶ ὁ διαλεκτικὸς ἕκαστον αὐτῶν, οἷον ὀργὴ τί ἐστίν· ὁ μὲν γὰρ ὀρεξίν ἀντιλυπήσεως ἢ τι τοιοῦτον,

ὁ δὲ ζέσιν τοῦ περὶ καρδίαν αἵματος καὶ θερμοῦ. τούτων δὲ ὁ μὲν τὴν ὕλην ἀποδίδωσιν, ὁ δὲ τὸ εἶδος καὶ τὸν λόγον. ὁ μὲν γὰρ λόγος ὅδε τοῦ πράγματος, ἀνάγκη δ' εἶναι τοῦτον ἐν ὕλῃ τοιαδί, εἰ ἔσται (*De An.* 403a 29-403b 3).

There are two ways to define affections: one based on their material aspect and another based on the form of their essence. That form, which corresponds to an affection, cannot be incorporeal; it must therefore be «in appropriate matter». Later, in 2.1, we will find that the matter referred to here needs to be organic, making it ‘appropriate’. As Boeri points out, this means that «the soul, as form, can only occur in a certain kind of body or material system, i.e. one that can be described as being capable of having organic functions»³⁸. Furthermore, in 1.3, while discussing with previous thinkers how the body and soul are related, he states:

Men associate the soul with and place it in the body, without specifying why this is so, and how the body is conditioned; and yet this would seem to be essential. For it is by this association that the one acts and the other is acted upon, that the one moves and the other is moved; and no such mutual relation is found in haphazard combinations. But these thinkers only try to explain what is the nature of the soul, without adding any details about the body which is to receive it; as though it were possible, as the Pythagorean stories suggest, for any soul to find its way into any body, <which is absurd,> for we can see that every body has its own peculiar shape or form.

συνάπτουσι γὰρ καὶ τιθέασιν εἰς σῶμα τὴν ψυχὴν, οὐθὲν προσδιορίζαντες διὰ τίν' αἰτίαν καὶ πῶς ἔχοντος τοῦ σώματος. καίτοι δόξειεν ἂν τοῦτ' ἀναγκαῖον εἶναι· διὰ γὰρ τὴν κοινωνίαν τὸ μὲν ποιεῖ τὸ δὲ πάσχει καὶ τὸ μὲν κινεῖται τὸ δὲ κινεῖ, τούτων δ' οὐθὲν ὑπάρχει πρὸς ἄλληλα τοῖς τυχοῦσιν. οἱ δὲ μόνον ἐπιχειροῦσι λέγειν ποῖόν τι ἡ ψυχὴ, περὶ δὲ τοῦ δεξιομένου σώματος οὐθὲν ἔτι προσδιορίζουσιν, ὥσπερ ἐνδεχόμενον κατὰ τοὺς Πυθαγορικοὺς μύθους τὴν τυχοῦσαν ψυχὴν εἰς τὸ τυχὸν ἐνδύεσθαι σῶμα. δοκεῖ γὰρ ἕκαστον ἴδιον ἔχειν εἶδος καὶ μορφήν (*De An.* 407b 15-24).

³⁸ Boeri 2010, p. 10 n. 22.

Aristotle begins by stating that other accounts of the soul fail to explain how the soul is in the body. Note that he does not deny that the soul is in the body, but instead considers these accounts insufficient in explaining how this occurs. Next, he suggests that the interaction between body and soul is like an association (κοινωνία), in which one acts (the soul) and the other is acted upon (the body), as happens in movement. Furthermore, this interaction cannot take place between any soul and any body. Since there is a κοινωνία between them, it would be absurd to propose such an interaction. The conclusion is that every soul has its own specific body³⁹. These points lead us to understand that, for the philosopher, saying that the soul is in the body (literally, that the body «receives» the soul) poses no problem, and that Aristotle's difficulty with earlier accounts lies in how this reception is conceived. From this point onwards, he systematically discusses, in this treatise, the soul as being or residing in the body (e.g., 408b 24-25). Based on this evidence, it seems unthinkable for the philosopher to deny that the soul is, indeed, «in» the body. However, he never clarifies how this occurs. This remains an unresolved question even today. The only hint is the heart, which explains the body's physiological mechanisms, but the metaphysical explanations required to understand how an immaterial entity can act upon a material one are absent from his works⁴⁰. Nonetheless, the fact that one resides in the other in a specific part remains unquestioned⁴¹.

Finally, let us address the issue of the compatibility between cardiocentrism and entelechism. As stated before, Ross and Nuyens consider these two theories incompatible. It seems to us that their main problem lies with causality. They question how the soul can be the cause of movement, nutrition, perception, and so on, if it is tied to a specific organ. How can it be, they ask, the form of an organic body if it is not present in all the parts that constitute that body? Conversely, they posit that the soul must be present in every part of what is the form, i.e., in the whole body. Their main issue regarding the compatibility of cardiocentrism and entelechism can thus be summarised as follows: the soul can act as the cause of psychophysical phenomena as long as it is present in the corresponding part of the body. There is more than enough evidence to address this problem. First, as a general observation, we have seen that Aristotle himself incorporated the main tenets of these two theories in different passages. Therefore, there must be a way for the soul to reside at the heart and still act as the form of the entire body.

For this, we will examine two passages. The first is from *Mot. An.*:

³⁹ Among other issues, this passage has been employed to argue for the soul's particularity against those who defend a certain form of universalism or monopsychism. On this, see Leiva 2024.

⁴⁰ Boeri 2010, p. CXIII n. 111.

⁴¹ This conclusion is widely accepted nowadays. See, for example, Gregoric 2020, p. 443; Rapp 2023, p. 25.

But the animal must be supposed to be constituted like a well-governed city. For in the city, as soon as order is established, there is no need for a separate monarch who must be present at all the goings-on, but each part itself does its own thing as instructed, and this follows that because of habit. In animals, the same thing comes about because of their nature and the fact that each of the parts is constituted so as to be naturally suited to performing its own task, with the result that there is no need of soul in each part, but it resides in some bodily origin and the other parts live by being naturally attached to that, and perform their own work because of nature.

ὑποληπτέον δὲ συνεστάναι τὸ ζῶιον ὥσπερ πόλιν εὐνομουμένην. ἔν τε γὰρ τῇ πόλει ὅταν ἅπαξ στήι ἡ τάξις, οὐθὲν δεῖ κεχωρισμένου μονάρχου, ὃν δεῖ παρῆναι παρ' ἑκάστων τῶν γινομένων, ἀλλ' αὐτὸς ἑκάστος ποιεῖ τὰ αὐτοῦ ὡς τέτακται, καὶ γίνεται τόδε μετὰ τόδε διὰ τὸ ἔθος· ἔν τε τοῖς ζώοις τὸ αὐτὸ τοῦτο διὰ τὴν φύσιν γίνεται καὶ τῷ πεφυκέναι ἑκάστων, οὕτω συστάντων, ποιεῖν τὸ αὐτοῦ ἔργον, ὥστε μηδὲν δεῖν ἐν ἐκάστῳ εἶναι ψυχὴν, ἀλλ' ἐν τινὶ ἀρχῇ τοῦ σώματος οὕσης τὰ ἄλλα ζῆν μὲν τῷ προσπεφυκέναι, ποιεῖν δὲ τὸ ἔργον τὸ ἑαυτῶν διὰ τὴν φύσιν (*Mot. An.* 703a 29-703b 2).

Aristotle here presents the following analogy: if we compare the body of an animal to a well-governed city, it becomes clear that the governor of the city need not be present in every part or involved in every aspect of public life. Since order has already been established (which is why, for the analogy to work, it must be a well-governed city), and each part understands its role and function, the governor can remain in one area of the city while still governing all of it. This is possible because the governor's power and influence extend beyond its immediate location. Similarly, «there is no need of soul in each part», but rather «it resides in some bodily organ». For the other parts to perform their roles, they need to be attached to the heart. This is where Aristotle's biological investigations come into play. According to Aristotle, the heart is connected to the rest of the body, for example, through veins and blood vessels (*Part. An.* 665b 16-17). It is through the transportation of blood that all other organs can carry out their specific functions, much like a well-governed city⁴². Additionally, later in that chapter, the philosopher notes that «all motions of sensation, including those produced by what is pleasant and painful, undoubtedly begin in the heart and have their final ending there» (Ἐτι δ' αἱ κινήσεις τῶν ἡδέων καὶ τῶν λυπηρῶν καὶ ὅλως

⁴² For a more comprehensive analysis of this analogy, see Gregoric 2020, pp. 438-444.

πάσης αἰσθήσεως ἐντεῦθεν ἀρχόμεναι φαίνονται καὶ πρὸς ταύτην περαίνουσαι) (*Part. An.* 666a 11-14). In other words, the heart, which contains the soul, produces and controls all psycho-physical activities without needing to travel through the body, because everything, by being connected, begins and ends there.

Finally, another analogy to address the causality problem can be found in the final section of *Motu An.* 7.

Just as the automatic theatres are set in motion when only a small movement has happened—when the cables are released and the <figures immediately> strike their <sabres> against one another—and as the little wagon which <the> driver himself tries to move in a straight line <again> and again but which is moved in a circle because it has unequal wheels—for the smaller one comes to function as a centre-point, just as in the case of cylinders—so too are animals moved. For they have organs of that sort, with the nature of sinews and the nature of bones, the ones like the wood and iron in the former case, and the others—sinews—like the cables; they are moved when these things are untied and unfastened.

ὥσπερ δὲ τὰ αὐτόματα κινεῖται μικρᾶς κινήσεως γενομένης – λυομένων τῶν στρεβλῶν καὶ κρουόντων πρὸς ἀλλήλας <εὐθὺς τῶν ζωιδίων τὰς μαχαίρας>, καὶ τὸ ἀμάξιον, ὅπερ <ὁ> ὀχούμενος αὐτὸς κινεῖ εἰς εὐθὺ <πάλιν> καὶ πάλιν, κύκλῳ δὲ κινεῖται τῷ ἀνίσους ἔχειν τοὺς τροχοὺς – ὁ γὰρ ἐλάττων ὥσπερ κέντρον γίγνεται, καθάπερ ἐν τοῖς κυλίνδροις –, οὕτω καὶ τὰ ζῶια κινεῖται. ἔχει γὰρ ὄργανα τοιαῦτα τήν τε τῶν νεύρων φύσιν καὶ τὴν τῶν ὀστέων, τὰ μὲν ὡς ἐκεῖ τὰ ξύλα καὶ ὁ σίδηρος, τὰ δὲ νεῦρα ὡς αἱ στρέβλαι, ὧν λυομένων καὶ ἀνιεμένων κινεοῦνται (*Motu An.* 701b 1-10).

This final passage makes it even clearer how the soul, residing in the heart, causes movement throughout the rest of the body. We have already noted that the heart is responsible for movement in living beings, and this passage offers the specifics. Aristotle compares the body to an automatic puppeteer that moves all the puppets using cables, wheels, cylinders, and so on. Similarly, the heart moves the entire body through bones and sinews, with a pulling and releasing motion (*Motu An.* 703a 19). Therefore, the bones and sinews make it

unnecessary for the soul to be in each limb pulling and releasing⁴³. Since the entire system is connected, it can control this process from a single centre—the heart⁴⁴.

Analysing these two passages, it appears that Aristotle not only did not see any contradiction between a central organ governing all life in which the soul resides, but also provided biological mechanisms to explain this causal process. Consequently, a certain form of cardiocentric hylomorphism is not only plausible but arguably the most appropriate interpretation of the interaction between body and soul, rendering entelechism untenable in light of the evidence. Nuyens and Ross are not incorrect when asserting that there is a form of entelechism in *De An.*, but they considered only a strong version wherein the soul can no longer reside in the heart and, at the same time, act as the form of the body. As we have tried to show, this is ultimately inaccurate since both roles can happen simultaneously.

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⁴³ Tracy 1983, p. 330, arrives at the same conclusion. For further analysis on this analogy, see Frampton 1991, pp. 321-325.

⁴⁴ Tracy 1983, p. 329, mentions that the soul is *primarily* in the heart, not exclusively, which makes sense when reading the passages cited.

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