

Aristotle's theory of seed: seeking a unified account¹

A teoria de semente de Aristóteles: em busca de uma concepção unificada

Xinkai Hu

<https://orcid.org/0000-0003-1354-8182>

Department of Philosophy and Science, Southeast University, Nanjing, China. Email: xkhu@seu.edu.cn.

ABSTRACT

Aristotle's theory of seed has occupied a very important place in the history of ancient embryology and medicine. Previous studies have overemphasized, in light of the *APo. II* method, Aristotle's definition of seed as male semen. In this paper, I wish to show that there are at least three independent definitions of seed working in Aristotle's *Generation of Animals*: seed as male semen, seed as female menstruation and seed as embryo. Those three definitions are mutually exclusive on the one hand, but on the other hand, they are also capable of being unified into one Aristotelian account, which can help us understand better Aristotle's theory of seed.

Keywords: Aristotle, theory of seed, animal, generation.

RESUMO

A teoria da semente de Aristóteles ocupou um lugar muito importante na história da antiga embriologia e medicina. Estudos anteriores enfatizaram demais, à luz do método da *APo. II*, a definição de Aristóteles de semente como sêmen masculino. Neste artigo, desejo mostrar que existem pelo menos três definições independentes de semente trabalhando na *Geração dos Animais* de Aristóteles: semente como sêmen

¹ This work was supported by Social Science Foundation of Jiangsu Province, China (Grant Number 21ZXC004), Innovation and Entrepreneurship Doctor Program of Jiangsu Province, China (Grant Number JSSCBS20210080) and Moral Development Institute of Southeast University.



masculino, semente como menstruação feminina e semente como embrião. Essas três definições são mutuamente excludentes por um lado, mas, por outro lado, elas também são capazes de ser unificadas em uma explicação aristotélica, o que pode nos ajudar a entender melhor a teoria da semente de Aristóteles.

Palavras-chave: Aristóteles, teoria da semente, animal, geração.

Introduction

According to the traditional account, the Hippocratic doctors before Aristotle generally hold that the females contribute seeds to the animal generation. After Aristotle, either Galen or the neo-platonists confirm that the females play an equal positive role as their male counterparts do in the animal generation.² It seems that only in the Aristotelian tradition, the females are “deprived” of the ability to provide seeds.³ In the *Generation of Animals* (hereafter GA), Aristotle repeatedly claims that the females contribute nothing like the male semen (GA 727a28; 728a31), but provides menstruation instead. The menstruation is only the sort of material that the male semen works upon. All these seem to suggest that the males are the sole provider of the seeds. According to this account, therefore, Aristotle’s theory of seed is some sort of one-seed theory.

In the last three decades, however, with Aristotle’s biological works getting more and more attention, scholars begin to question the preconceived view that Aristotle’s female does not provide seeds. Scholars now generally believe that the female menstruation and the male semen are all “seeds” for Aristotle, and the role of the females in the animal generation is far more positive than once thought (Mayhew, 2004; Henry, 2006; Gelber, 2010; Connell, 2016). But by admitting that the female menstruation is seed in the Aristotelian sense, another vexing problem comes up, that is: if Aristotle admits the existence of different seeds, on what basis can he call them all “seed”? Further, if we consider the fact that Aristotle also take the animal embryo (including the plant seed) as seed, the problem becomes even more complicated. What is the Aristotelian seed, and whether Aristotle has a consistent and unified account of seed, this is the main focus of my paper. In what follows, I shall try to seek a unified account of seed in the GA. In the second section, I discuss the various usages of seed in the Aristotelian corpus. I will point out that there is plenty of textual evidence showing that not only is female menstruation a seed in the Aristotelian sense, but that the primary mixture of the male and female seminal fluids or the embryo is also a seed in the Aristotelian sense. In fact, Aristotle’s seed can refer to three completely different things: the male semen, the female menstruation, and the embryo of an animal. In the third section, I seek a unified definition of Aristotle’s concept of seed. I argue that the male semen, the female menstruation and the embryo of an animal are all seeds in the Aristotelian sense, because they are all “potential animals” for Aristotle.

1. Aristotle on Seeds

It seems that Aristotle has never given out a unanimous account of the seed in GA.⁴ We can find at least three different definitions of seed in GA:

² For a history of the development of the theory of animal embryology in ancient Greece, see Preus, 1977; Wilberding, 2016, p. 321-324. It is worth noting that Plato’s place in this history is controversial, in part because Plato’s embryological views are largely scattered sporadically throughout his various dialogues. Wilberding, in his recent work, suggests that Plato was supposedly a seed dualist, although the seeds provided by the female may have no practical use in animal generation (Wilberding, 2015, p. 161-162).

³ Of course, I don’t mean to suggest that there are no other Greek philosophers or thinkers besides Aristotle that had adopted the one-seed theory. In fact, Anaxagoras, Aeschylus, Euripides and the Stoics are all more or less considered to be proponents of the one-seed theory (cf. Aeschylus, *Eumen.*, 657-666; Euripides, *Orest.*, 551-6; Censorinus, *De dei nat.*, 5.4; Aëtius, *Plac. phil.*, 5.11.4). Aristotle, however, is thought to be the only philosopher that has systematically expounded and defended the one-seed theory in the history of embryology.

⁴ According to Balme (1992, p. 131), seed could refer to (1) the seed of a plant; (2) the male seminal fluid; (3) the female seminal fluid; (4) the first stage of the embryo, and this account is in harmony with what we are going to say about Aristotle’s definition of seed regarding animal generation.

Definition 1: The seed is a seminal secretion from both male and female alike, which contains principles (ἀρχαί) [either male principle or female principle] of generation (GA 716a4-a15).

Definition 2: The seed is something that contains principles (ἀρχαί) from both the parents which have copulated ... like the first mixture which is formed from the male and female⁵ (GA 724b14-18).

Definition 3: The seed is a residue derived from useful nourishment, and not only that, but from useful nourishment in its final form; the menstruation is a residue which is analogous thing in females to the seed (γονή) in males⁶ (GA 726a26-28; 727a2-4).

The three definitions of seed disagree with each other: Definition 1 suggests that the contributions from both male and female are seeds; Definition 2 suggests that both contributions from male and female are not seeds, but the mixture, e.g. the embryo (κύημα), is (GA 728b32-34; Also cf. *Met.* Z.1032a31-33; *Θ.*1050a5-6; *K.*1058b23-24; *Λ.*1073a1-3); Definition 3 suggests that the contribution from the male is seed, while that from the female is not but an analogue to it.⁷ The widely-asserted position that Aristotle holds that only the male contributes seed and the female does not comes from Definition 3. But there are other positions, as we have seen, in which Aristotle seems to hold contradicted views that both male and female contribute and do not contribute seeds. Which account, then, reflects Aristotle's genuine view about animal seed?

Robert Bolton argues that in giving out his definitions on seed, Aristotle has followed the methodological instructions laid out in the *Posterior Analytics*.⁸ In Bolton's view, there are three stages through which "Aristotle did pull things together" (Bolton, 1987, p. 163-164). Aristotle, starting from "what we call seed" or the "common understanding of seed", finally "reached the point where he has improved our knowledge that seed exists to the point where he can say the menstruation is or are not seed" (Bolton, 1987, p. 157-158, p. 163). In other words, there is a progression, which fits the scientific procedure found in *APo.* II. 8-10, from Definition 1 to Definition 3, viz. from what Bolton calls the "common understanding" of seed (which refers to both male and female contributions) to a "better understanding" of seed (which alludes to male contribution alone).⁹ But such an interpretation faces three difficulties. First, the allusion of female menstruation as seed or something seed-like is not, as Bolton suggests, restricted to Aristotle's initial discussions but is rather spread all over the treatise (Cf. 736b8-9; 737a28-29; 749b3-9; 766b12-14; 771b20-21; 776b15-16).¹⁰ Second, even it is conceded that there is a progression from Definition 1 to Definition 3, it is difficult to see how Definition 2, a definition that escapes, wittingly or unwittingly, Bolton's notice, could fit into the picture. Finally, there are many other passages in the Aristotelian corpus that suggest Definition 1 and Definition 2 also reflect Aristotle's genuine view on seed (*Phys.* 190b5, 196a31, 199b7; *PA.* 641b32; *Met.* 1049a1-5; 14-15; 1058b23-24; *Probl.* 876b11-14). Consider the following examples:

⁵ There are debates concerning Definition 2. Peck, 1942, p. 76, n.a, Lulofs, 1965, apparatus and text ad loc. and Balme, 1992, p. 145 all regard GA I.724b12-22 as a latter interpolation, but this view has recently been questioned by Bos, 2003, p. 180-181. In any case, however, the definition of seed given here is at least, to use Balme's own phrases, "not non-Aristotelian", and ought to be taken as one of the genuine Aristotelian views of seed.

⁶ In most cases, γονή (the male seminal fluid) and σπέρμα (the seed) are used interchangeably in GA. So is the case here. But there is one case, Definition 3, in which Aristotle does clearly distinguish between γονή and σπέρμα. In that case, γονή means exclusively the male seminal contribution in contrast with the σπέρμα which is defined as the mixture of both male and female seminal contributions (724b12-22).

⁷ The similar implication could also be found in e.g. *Met.* Z.1034b5-6, H.1044a34-35 and *Λ.*1071b29-31, where the male γονή and σπέρμα are used interchangeably.

⁸ Cf. Bolton, 1987, p. 120-166. According to Bolton, the three stages through which the definition of seed develops in GA I and II echoes with the three types of definition Aristotle distinguishes in *APo.* II.10.94a11-14: "one sort of definition is an indemonstrable account of what a thing is; a second is a proof of what a thing is - differing in arrangement from a demonstration; the third is a conclusion of a demonstration of what a thing is" (p. 143).

⁹ Though Bolton doesn't identify the progression as we do, it is reasonable to think that the progression he suggests has this implication. For what he takes to be Aristotle's initial definition of seed apparently applies to both male and female, while what he takes to be Aristotle's final definition of seed only applies to the male. See Bolton, 1987, p. 156, p. 164.

¹⁰ For a more detailed enumeration, see Balme, 1987, p. 293-294, n.14; Also see Mayhew, 2004, p. 35-36.

There is always some substrate, out of which the thing comes to be; for example, plants and animals come to be from seed (σπέρματος) (Phys. I.7.190b3-5).

For example, is earth potentially a human being? No, but rather when it has already become seed (σπέρμα), and perhaps not even then; just as not everything can be healed by medicine, or even by chance, but there is some definite kind of thing which is capable of it, and this is that which is potentially healthy And in all cases where the generative principle (ἡ ἀρχὴ τῆς γενέσεως) is contained in the thing itself, one thing is potentially another when, if nothing external hinders, it will of itself become the other. For example, the seed (σπέρμα) is not yet [potentially a human being], for it must also undergo a change in another [seed]. But when it has already been as such, it is, by its own generative principle, already potentially [a man]; whereas prior to this it has need of another principle; just as earth is not yet potentially a statue, because it must undergo a change before it becomes bronze (Met. Θ.7.1049a1-18).

If the seed in the context refers to the male semen, it will contradict Aristotle's claim that the male semen contributes nothing material (GA 730b13-15). For how could a plant or an animal comes into being from something incorporeal? Indeed, many commentators have noticed the inconsistency. But they seldom suspect that the seed in question might not be the male semen (Furth, 1985, p. 136; 1988, p. 120, n.27; and Tredennick, 1933, p. 450; the only exception I know is Connell, 2016, p. 105, n.38). As a result, they conclude that when the term "seed" is employed, Aristotle "writes as if he accepted the popular view which treated the male and female elements as uniting to form the matter of the offspring. He is merely illustrating a general principle; and in such cases he often writes from the point of view of a common theory not his own" (Ross, 1924, p. 255). Admittedly, it is not wholly impossible. But one ought to favor a more charitable reading if there is one, and to understand the seed in question as the female seed or the embryo is, as I argue below, such a reading.

The passage from *Physics* I is clearly not talking about the male semen. For the male semen, according to Definition 3, is the "nourishment in its final form" which is fully concocted and less in amount in contrast to the female contribution (GA 726b30-32; 728a4-6). In the ideal situation, the physical or material part of the male semen can even "dissolve and evaporate", and is not expected to be found "as an ingredient of the embryo when that has set and taken shape" (GA 737a7-16). How could, then, a bulky plant or animal comes out of something that is either thin in bulk or even non-existent after conception? The seed in *Phys. I.7.190b3-5*, therefore, can only be one of the other two alternatives: the female seed (the menstruation) or the embryo.¹¹

The passage from *Metaphysics* Θ.7 contains two references to the seed. Both of them, in my view, are referring to the female seed rather than the male seed. The first appears in 1049a1-5, where the seed is characterized as something made of earth. Is the male seed, in Aristotle's view, something made of earth? In the GA II.2, Aristotle writes that:

The seed (σπέρμα), then, is a compound of pneuma and water (pneuma being hot air), and that is why it is fluid in its nature; it is made of water [...] It is, of course, true that one seed must of necessity be earthier than another, and the earthiest will be in those animals which, for their bodily bulk, contain a large amount of earthy matter; but seed is thick and white because there is pneuma mixed with it (GA 736a1-9).

The seed or the male semen is primarily made of *pneuma* (a hot air) and water. That's why it will "dissolve and evaporate", and not to be found "as an ingredient of the embryo when that has set and taken shape" (GA 737a7-16). The incorporation of earth is due to the necessity that the bodily bulk of

¹¹ In the case of the plants, the seed here can only stand for the embryo; but in the case of the animals, the seed can stand for either the female seed or the embryo. In any case, however, the seed Aristotle has in mind cannot be the male semen.

animals varies, it must be allowed that the seed of some animals contain more earth than that of others. But "the more perfect animals are by nature hotter and more fluid and are not earthy" (GA 732b31-32), so the male semen, in the ideal situation, shall consist of nothing earthy, but of *pneuma* (a hot air) and water only. Thus the earth is merely a *per accidens* ingredient for the male semen.¹² It belongs to the male semen incidentally. By contrast, the female and the menstruation, as Aristotle portrays them, are much more related to earth or the earthy matter. The Earth, for example, is called mother and its nature is said to be something female in the mythology (GA 716a15-17).¹³ Also, the most unconcocted substance in animals is called the "earthy substance" (GA 745b19), which suggests that the menstruation, being an unconcocted seed, is also earthy. The weightiest evidence, however, is that when the menstruation has been "set", says Aristotle, "the fluid portion of the menstruation will come off, and the earthy portion will solidify so as to make membranes form all round its outer surface" (GA 739b24-27). All those suggest that the earth is a *per se* ingredient for the female seed (viz. the menstruation). And if it is so, it hardly makes sense that Aristotle is talking about the male semen here.

The other reference appears in 1049a14-15. The Greek text reads "οἷον τὸ σπέρμα οὐπω, δεῖ γὰρ ἐν ἄλλῳ καὶ μεταβάλλειν", which I translate as "the seed, for example, is not yet [potentially a human being], for it need [to be] in a different [seed] and to change".¹⁴ This, however, is not the general way of putting the sentence. Most English translators have followed Ross, who adds a *πεσεῖν* to the original so as to give the sentence a meaning that the male seed "falls" into the uterus and undergoes a change (Ross, 1924).¹⁵ But I don't think that the emendation is truly necessary. For if from the very start the seed Aristotle has in mind is not the male but the female seed (viz. the menstruation), there is no need, then, for the seed to "fall"; no need for the seed to fall in the "uterus"; in short, no need for the emendation. So the real question is: does it make good sense to say that the seed in question is the female seed?

Now on my reading, both *Met.* 0.7.1049a1-5 and 0.7.1049a14-15 are references to the female seed, and they are correlated. In 1049a1-5, Aristotle says that the earth is not potentially a human being. It has to undergo a change so as to become the female seed, which is "potentially a human being". Attention shall be paid to what Aristotle says right after: "perhaps even not then" (1049a2-3). It means that even the earth has become the female seed, the female seed is not yet, strictly speaking, "potentially a human being", and this is exactly the words that Aristotle chooses to start with in 1049a14-15. The connection between 1049a1-5 and 1049a14-15 is thus obvious: in order to become the female seed, the earth has already "changed" once in 1049a1-5. The female seed would have to undergo another

¹² According to Aristotle's discussion of *per accidens* predication in *APo.* I.4, I.19, I.22; *Met.* Δ.30 and *Phys.* I.3, a predication is *per accidens* to a subject if and only if (i) it can either belong or not belong to the subject or (ii) it is not in the definition of the subject (consider Aristotle's own example: "being seated" can either belong or not belong to X, and is not in the definition of X). In this sense, "being earthy" is a *per accidens* predication of the male semen insofar as it cannot belong to the male semen and is not in the definition of male semen. It is worthwhile to note, however, that "being earthy" can also in a way be a *per se* accident to the male semen if Aristotle holds that all seed (including the male semen) practically must have something earthy within them (a point which is not at all clear from the ambiguous texts). But whatever the case may be, "being earthy" is surely not a *per se* predication to the male semen.

¹³ Cf. The Pseudo-Aristotelian *De Plantis* 817a27-28, where the *Earth* is also said to be the "mother" of plants.

¹⁴ By a different "seed", I mean the *κύημα*. In the present context, *κύημα* is meant to be "the first mixture of male and female seeds", even though, as Peck (1942) correctly notes, that the term "is also meant by Aristotle to include more than this", which "covers all stages of the living creature's development from the time when the matter is first informed to the time when the creature is born or hatched" (p. lxii-lxiii). A similar usage of "seed" can be found in the Pseudo-Aristotelian *HA* X.5. 636b15-16: *Εἴπερ γὰρ καὶ ἡ γυνὴ συμβάλλεται εἰς τὸ σπέρμα καὶ τὴν γένεσιν* (For if the woman also contributes [something] to the seed and to the generation), see also 637b19.

¹⁵ The interpolation of *πεσεῖν* is certainly not Ross's own idea. According to Ross, it has already existed in Alexander's paraphrasing (p. 256). The problem is: unlike Alexander who, probably seeing that the text doesn't make much sense with the Aristotelian male seed, understands the seed as the "seed of plants", Ross takes it as "the male element in animal generation" and thus gives a wholly different meaning to the phrase *ἐν ἄλλῳ πεσεῖν* (namely, to fall in the [uterus]). Cf. Averroes, 2010, p. 264-265, n.375, who also understands *ἐν ἄλλῳ* as "[being placed] in the uterus". Objections, however, can be raised on behalf of the texts. In the first place, there is no single use of *πίπτειν* in Aristotle's own reproductive theory. Aristotle does use *πίπτειν* once (GA 769b31), but that occurs in a description of Democritus's rather than his own thoughts. Moreover, when Aristotle wants to describe that the male semen enters the uterus, he typically uses *εἰς* instead of *ἐν*, e.g. *ἔλθῃ εἰς τὴν ὑστέρα* (GA 737a20-21), *εἰς τὰς ὑστέρας ἀφικνεῖται* (GA 756b27-28), and *εἰς τὴν ὑστέρα* (GA 764a17-18).

change – by mixing with the male semen – so as to become what is “potentially a human being” in the strict sense (GA 740a24-25). On this reading, therefore, Ross’s emendation is unnecessary.

I have presented above an alternative reading of *Met.* Θ .7.1049a1-5 and 1049a14-15 (and thus of 1049a1-18 as a whole). Now such a reading is supported by various texts in the Aristotelian corpus. Firstly, there are many occasions in which Aristotle claims that female seed is potentially a human being. In GA 740b18-21, for example, Aristotle claims that “the residue [menstruation] provided by the female is potentially the same in character as the future animal will be”. Again, in GA 762b2-4, Aristotle says that the menstruation is a residue which “potentially is such as the parent is from which it came”. Broadly speaking, the claim that “the matter of a X is a potential X” occurs even more frequently: in the *Phys.* I.9.192a25-29, matter is said to be a potentiality. In the *Met.* H.1.1042a27-28, matter is defined as “that which is not a ‘this’ actually but a ‘this’ potentially”. In the *Met.* H.6.1045b19, Aristotle says that the proximate matter of a thing is potentially that which its form is actually. Finally, in the *Met.* N.1.1088b1-2, Aristotle claims that the matter of a substance must be “potentially that sort of thing”. Likewise, the textual evidence for the claim that female seed is not yet potentially a human being is also abundant. For example, Aristotle tells us that the female menstruation is not yet a full potentiality for it lacks the sentient soul, without of which the potential body exist in the female menstruation is said only to be a potential dead body (GA 741a10-13). The female menstruation can only get its full potentiality by mixing with the male seed, which is “the factor that produces the sentient soul” (GA 741a13-14). Also, in the GA 762b2-4, after saying that the menstruation is a residue which is a human being potentially, Aristotle adds that this potentiality will be “perfected ... by the principle from the male imparting movement to it (the menstruation)”. Given all this, it seems quite plausible to identify the seed in context with the female seed. And if it is so, the progressionist claim that Definition 3 represents Aristotle’s genuine or final definition of seed fails.

2. Seeking a Unified Account of the Aristotelian Seed

So far I have shown that Aristotle has three distinct and *prima facie* incompatible definitions of seed, and their incompatibility cannot be erased by a progressionist approach because the other two definitions, viz. Definition 1 and Definition 2, continue to occur not only in the latter books of GA but also in the other Aristotelian works. Against this approach, I wish to provide in the following a much more unified way of understanding Aristotle’s view about seed. I would like to begin with the following passage from GA I 726b15-19:

Therefore, the seed of the hand or of the face or of the whole animal really is hand or face or a whole animal though in an undifferentiated way (ἀδιορίστως); in other words, each of those is such (τοιοῦτον) in actuality (ἐνεργείᾳ), the seed is such in potentiality (δυνάμει); whether in respect of its own bulk, or because it has certain potentiality (δύναμιν) within itself (emphasis added).

For me this passage is important. For it offers another account of seed that is able to unify all the previous definitions of seed:

Definition 4: The seed is what is an animal (either in part or in whole) in *potentiality*.

The way in which Definition 4 defines the seed is not unfamiliar to us. For this is also the way in which the (female) seed gets defined in the *Met.* Θ .7.1049a1-18 – the (female) seed being “what is a human being potentially”. But if Definition 4 is indeed *the one* account that is able unite all the previous definitions, it shall able to explain why, in Aristotle’s view, (a) the male semen, the female menstruation and the embryo are all seed, on the one hand; and that (b) the male semen is more a seed than the female menstruation is, and the embryo more than any of them, on the other hand.

Let us first consider (a). If Definition 4 is going to have some explanatory forces over (a), it shall be able to show that the male semen, the female menstruation and the embryo are all “what is an animal in potentiality” for Aristotle. Does the text support such a claim? From the cited passage, it is clear that Aristotle distinguishes between X being an animal potentially due to “its own physical bulk” and “its own potentiality within”. The female menstruation is “an animal in potentiality due to its own bulk”. For it contains physically all the parts of the animal body potentially (GA 737a23), and therefore possesses the “the material ἀρχή” of generation (GA 762b1). The male semen, by contrast, is also “an animal in potentiality”, yet not for the same reason, but for its possession of certain formal potentiality, the principle of form (τὴν ἀρχὴν τοῦ εἶδους), which is identified as “the ἀρχή of movement” in its other occurrence (GA 730a26-27).¹⁶ It is worth noting that the phrases Aristotle uses to denote the two potentialities vary across the text. He also uses, for example, the “ἀρχή of (sentient) soul” to denote the male potentiality (GA 737a29), and the “potentiality of nutritive soul” to denote the female potentiality (GA 740b30). Elsewhere, Aristotle uses indiscriminately the expression “the ἀρχαὶ (including the female ἀρχή and the male ἀρχή) of generation” to denote both male semen and female menstruation (GA 716a6). But whatever they are named, either the male semen or the female menstruation certainly possesses soul-potentiality of some sort, and is therefore “what is an animal in potentiality”.

What about the embryo,¹⁷ then? Though the cited passage does not talk about the embryo, we have reason to think that the embryo is also something τοιοῦτον δυνάμει, something being “an animal potentially” for Aristotle. For there are quite a few textual evidence to support. In the GA 740a1-2, for example, Aristotle claims “in this way too, all the parts [of an animal] are present in the embryo potentially”. And shortly after in the GA 740a24, it is said even more bluntly that “the embryo is already an animal potentially”. Aristotle holds that the embryo is an animal potentially because the “ἀρχή of soul”, the soul-potentiality is also present in the embryo (GA 737a33-34). But the “ἀρχή of soul” the embryo possesses is neither the male soul-potentiality (viz. the “ἀρχή of (sentient) soul” that we have identified in the last paragraph) nor the mixture of both male and female soul-potentiality. It is the *first actuality* (ἐντελέχεια ἡ πρώτη) of the soul-potentiality present in the male and female seminal fluids, as the “ἀρχή of soul” in the embryo, says Aristotle, “has made the most headway” and “become distinct in actuality” (GA 740a2-3). The result of this actualization is the formation of the heart, which, according to Aristotle, is the first thing to be formed in the embryo (GA 743b26) and “what can first be seen as something distinct in actuality” (GA 740a4; Cf. Peck, 1942, p. 194, n.c; GA 740a18-19). It is important to note, however, that the first actuality is for Aristotle still a kind of potentiality – a potentiality to engage in the activity which is the corresponding second actuality. The heart, therefore, remains a soul in potentiality, or, as Aristotle calls it, an “ἀρχή of soul” which is later specified as “the ἀρχή of both uniform parts and non-uniform parts of the body” (GA 740a18-19) – in short, the ἀρχή of all organism (GA 740a20).

We can conclude, then, that the male semen, the female menstruation and the embryo are all seeds for Aristotle because they all possess soul-potentiality of some sort: the male semen possesses a sentient soul-potentiality, the female menstruation possesses a nutritive soul-potentiality, and the embryo possesses a soul-potentiality that is both the first actuality of the two potentialities present in the male semen and female menstruation and the second potentiality of all the parts (uniform and non-uniform) of the future animal.

Let us now turn to claim (b). For our discussion's sake, I will divide it into two separate claims:

(b1) the male semen is more a seed than the female menstruation is, and

¹⁶ Aristotle repeatedly links potentiality (δύναμις) and ἀρχή of a movement or a change in his corpus, especially in his standard definition of potentiality as ἀρχή μεταβολῆς ἐν ἄλλῳ ἢ ἢ ἄλλο (a principle/starting point of a change in another thing or in the thing itself qua another) (Met. 1046a11; Cf. also 1019a15; 1020a6; DC 301b18).

¹⁷ By the embryo of an animal Aristotle means the mixture of both male and female seminal contributions. Though Aristotle sometimes uses the term “embryo” (κύημα) in a sense that also includes the single seminal contribution of one sex, e.g. wind egg, qualifications are always made in such cases. For example, it is said that the wind egg is a “embryo” only in the sense of the embryo of a plant (DA 757b18-19).

(b2) the embryo more than any of them.

I divide the claim because I think Aristotle holds (b1) and (b2) for different reasons, and with different emphases. Aristotle holds (b1) probably because the soul-potentiality present in the male semen (the "ἀρχή of sentient soul") is, in his view, more an ἀρχή or δύναμις of *animal* than the soul-potentiality present in the female menstruation (the δύναμις of nutritive soul). For according to Aristotle, the "ἀρχή of sentient soul" is exclusive to animals, while the "δύναμις of nutritive soul" is also present in those living beings other than the animals (e.g. the plants) (DA 413a34-b2; Cf. GA 741a9-12; 26-29). If the "ἀρχή of sentient soul" present in the male semen belongs more to *animal* than the "δύναμις of nutritive soul" present in the female seed does, it seems reasonable for Aristotle to say that the male semen is more an "*animal in potentiality*" than the female menstruation is, and is therefore, according to Definition 4, more a seed than the female menstruation is.

Aristotle holds (b2) probably because there are different grades of potentiality. In DA 417a20-b2, Aristotle distinguishes between two kinds of potentiality. One is remote and latent, and the other is proximate and active: someone might be a knower in the sense that s/he has rational faculty. But having rational faculty is only a *remote* potentiality for s/he's being a knower. It cannot explain why one has some specific sort of knowledge, say, grammatical knowledge. One's possession of grammatical knowledge can only be explained by a more *proximate* potentiality, which is present only after one has actualized one's remote potentiality, viz. one's rational faculty to learn grammar. The same applies to the seminal fluids and the embryo. The soul-potentiality that the seminal fluids (be it the nutritive one or the sentient one) possesses is only a *remote* potentiality. It has to be actualized, and the result of the actualization is, as we have mentioned previously, the heart, which is the second or *proximate* potentiality of the animal soul. If the male and female seminal fluids have the potentiality to be an animal, the embryo is then the actualization of this potentiality as potentiality, and therefore bears a much closer relationship to the actuality of an animal. In this sense, the embryo is arguably more "*an animal in potentiality*" than any of the seminal fluids is. It is indeed, according to Definition 4, more a seed than any of the seminal fluids is.

We may conclude that though the male semen, the female menstruation and the embryo are all seed for Aristotle, they are not seed of the same degree. The male semen is more a seed than the female menstruation because the male semen is more an "*animal in potentiality*" than the female menstruation is; the embryo is more a seed than both the male and female seminal fluids are because the embryo is more an "*animal in potentiality*" than both the male and female seminal fluids are.

It is quite clear by now that Aristotle's Definition 4 that the seed [of an animal] is a potential animal does bridge the gap between Aristotle's three definitions of the seed: the male semen, the female menstruation and the embryo are all seeds because they are all potential animals, but at the same time the proximity of their potentialities determines that they are seeds in different degrees, i.e. the male semen is more of a seed than the female menstruation, and the embryo is more of a seed than the male and female seminal fluids. In this sense, Definition 4 is indeed the unified account of Aristotelian seeds that we are looking for.

Conclusion

In sum, there are three independent definitions of seed in Aristotle's *Generation of Animals*: the male semen as seed, the female menstruation as seed, and the primary mixture of the male and female seminal fluids or the embryo as seed. These three different concepts of the seed may seem irreconcilable at first glance, but in fact they can be unified under Aristotle's another definition of the seed. This definition is "*the potential animal as seed*". In Aristotle's view, the male semen, the female menstruation and the embryo are all seeds ultimately because they are all potential animals, that is, they all possess

some sort of starting point of animal generation, viz. the soul-potentiality. They differ only in the kind and the actuality of their soul-potentiality. The result is, the male semen is in one sense more a seed than female menstruation, while the embryo is in one sense more a seed than male and female seminal fluids.

References

- AVERROES. 2010. On Aristotle's "Metaphysics": An Annotated Translation of the So-called "Epitome". Walter de Gruyter, 388 p.
- BALME, D. M. 1987. Aristotle's Biology was not Essentialist. In: A. GOTTHELF; J. G. LENNOX (Eds), *Philosophical Issues in Aristotle's Biology*. Cambridge, Cambridge University Press, p. 291-312.
- BALME, D. M. 1992. *Aristotle's De partibus animalium I and De generatione I (with passages from II 1-3)*. Oxford, Clarendon Press, 192 p.
- BOLTON, R. 1987. Definition and Scientific Method in Aristotle's Posterior Analytics and Generation of Animals. In: A. GOTTHELF; J. G. LENNOX (Eds), *Philosophical Issues in Aristotle's Biology*. Cambridge, Cambridge University Press, p. 120-166.
- BOS, A. P. 2003. *The Soul and Its Instrumental Body: A Reinterpretation of Aristotle's Philosophy of Living Nature*. Brill Publishers, 444 p.
- CONNELL, S. 2016. *Aristotle on Female Animals: A Study of the Generation of Animals*. Cambridge, Cambridge University Press, 453 p.
- FURTH, M. 1985. *Metaphysics: Zeta, Eta, Theta, Iota*. Indianapolis, Indiana, Hackett Publishing Company, 166 p.
- FURTH, M. 1988. *Substance, Form and Psyche: an Aristotelian Metaphysics*. Cambridge, Cambridge University Press, 316 p.
- GELBER, J. 2010. Form and Inheritance in Aristotle's Biology. *Oxford Studies in Ancient Philosophy*, **39**: 183-212.
- HENRY, D. 2006. Understanding Aristotle's Reproductive Hylomorphism. *Apeiron*, **39**: 257-288.
- LULOFS, H. J. D. 1965. *De Generatione Animalium*. Oxford, Clarendon Press, 223 p.
- MAYHEW, R. 2004. *The Female in Aristotle's Biology: Reason or Rationalization*. Chicago, University of Chicago Press, 128 p.
- PECK, A. L. 1942. *Aristotle: Generation of Animals*. Cambridge, Massachusetts, Harvard University Press, 607 p.
- PREUS, A. 1977. Galen's Criticism of Aristotle's Conception Theory. *Journal of the History of Biology*, **10**: 65-85.
- ROSS, W. D. 1924. *Aristotle's Metaphysics: A Revised Text with Introduction and Commentary*. Oxford, Clarendon Press, 994 p.
- TREDENNICK, H. 1933. *The Metaphysics: Volume 1*. Cambridge, Massachusetts, Harvard University Press, 512 p.
- WILBERDING, J. 2016. The Revolutionary Embryology of the Neoplatonists. *Oxford Studies in Ancient Philosophy*, **49**: 321-361.
- WILBERDING, J. 2015. Plato's Embryology. *Early Science and Medicine*, **20**: 150-168.

Submitted on August 5, 2021.

Accepted on November 10, 2021.