

# THE SOUL-PARTS AS A CAUSE OF EMBRYOGENESIS IN ARISTOTLE'S *DE GENERATIONE ANIMALIUM*

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ABSTRACT. In *De generatione Animalium* Aristotle proposes a theory of embryogenesis and indicates its causes. An account of embryo's animation plays an important role in this theory. From the moment of conception foetus is generated as a living and animated being, and its actual soul appears as a principle of its development and growth. However, unless embryo comes to perfection its soul is also incomplete. The animation of the embryo is a process which consists of successive actualization of its soul's parts and powers. Parts of the soul are both the causes of generation and the actuality of yet non-perfected embryo. In this paper Aristotle's conception of embryogenesis will be considered in the context of his doctrine of soul-parts and organic composition.

KEYWORDS: Aristotle, embryogenesis, semen, soul, life, nature, organism, parts of soul.

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## 1. Soul as an origin of life

In the *De Anima* II, 1 Aristotle defines the soul as essence, form and actuality of a natural body that is potentially alive (Arist. *DA* 412a 19-21). The soul as actuality is a principle of organic unity and the origin of life (*DA* 411b 9-14; 412b 9-17). Therefore, the soul animates only a certain kind of body, that is, one possessing a possibility (*dynamis*) of having namely a given actuality (*DA* 414a 19-28). What is this corporeal *dynamis*? According to Aristotle, the body's capacity for being ensouled means a capacity for life, while by life he refers to self-nutrition, decay and

growth, as well as perception, local movement, and thinking (*DA* 413a 22-2). Each of these is a certain type of activity into which a material body is engaged,<sup>1</sup> therefore, for a body to be potentially alive means to have a capacity to perform natural movements.<sup>2</sup> The corporeal capacity for life is determined by its structure, that is, by the fact that it has organs and parts required for nutrition, growth, perception, etc. That's why for Aristotle the soul is an entelechy of an organized body (*DA* 412b 5-6). Different kinds of body, according to their own nature, have diverse organs and, correspondingly, are able to perform different kinds of activity and do perform this activity in different ways, according to their own organic structure. E. g., plants only have the ability for nutrition, growth, decay and reproduction, while animals also have sense perception and local movement. Some animals as well as humans possess imagination (*DA* 428a 8-13), only a human being has a capacity for thinking.

According to its material structure, body may perform different functions, although functions of each body correspond to the very soul present in this body as an actuality, as a principle of organic unity and a cause of co-operation of all its parts.<sup>3</sup> The body becomes a whole united organism only by being ensouled.<sup>4</sup> The entirety of the body is arranged not as a proportion of material parts—a corpse may display this proportion until it is decomposed, though it is neither whole nor united,—but is in fact a proportion of different movements and types of activity.

Thus, to be alive means to perform movements proper to the own nature of a plant, an animal or a human being. Therefore, an organic body is matter or an instrument of the soul (*DA* 412b9-413a3). Nevertheless, Aristotle attributes the faculty of life not only to completed organic bodies, he also expands the concept of life to the bodies still incomplete and insists that an embryo and a semen are potentially alive (*DA* 412b 27). Once both an embryo and a semen are capable of life, to some extent they have a soul (*GA* 737a 16-18). But to what extent a semen could be capable of life, since it has no organs? How could an incomplete body of an embryo have life, actuality and, therefore, unity? To get an answer to these questions, I will consider Aristotle's view on animation of an embryo in the context of his theory of soul and its parts.

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<sup>1</sup> I will not consider here *ψυχή* as a part of the soul because its activity does not include the body (*DA* 413b 24-27). In the *De generatione animalium*, Aristotle does not speak precisely of how the intellect appears in the body (*GA* 736b27-9), cf. Wilberding 2017, 27 n. 17.

<sup>2</sup> Johansen 2012, 15-18.

<sup>3</sup> Cf. Bos 2000, 29-30.

<sup>4</sup> Johansen 2012, 16.

## 2. Semen as a bearer of soul

In the *De generatione animalium* Aristotle exposes the causes of generation:

“How, we ask, is any plant formed out of the semen, or any animal out of the semen? That which is formed by means of a process must of necessity be formed (a) out of something (b) by something (c) into something (ἀνάγκη γὰρ τὸ γινόμενον καὶ ἔκ τινος γίνεσθαι καὶ ὑπὸ τινος καὶ τί)” (Arist. *GA* 733b 23-26, transl. by A.L. Peck).

The cause ἔκ τινος is a matter which a female animal gives at conception and during the growth of an embryo, the cause ὑπὸ τινος is a formal one due to which the embryo becomes not only matter, but also a definite something, τί. The efficient cause is either present in the semen and in the embryo or shall be external (*GA* 733b 26 ff.). Aristotle rejects the possibility of an external cause (*GA* 734a 2-9; 736b 22-24). Thus, there is a certain origin of the corporeal activity in the very semen, which imparts movement to the matter of the embryo (*GA* 729b 1-21),<sup>5</sup> and due to that movement the matter becomes a living body. The movement which semen imparts to an embryo is itself received from the father,<sup>6</sup> therefore, it is not semen that appears to be the origin of birth, but it is the father himself who delivers motion to the embryo through semen (*GA* 729b 12-14; 730b 19-24).

A semen does not have any organs, and it means that it can not stand as matter of soul or a substrate of that soul's activity; although, it does in fact possess the capacity for life (*DA* 412,27-28; *GA* 735a 4-9; 736a 33-35; 736b 8-11) and moreover, Aristotle defines it as an organ or an instrument (ὄργανον; *GA* 730b 19-21). However, the semen is capable of life not in the sense identical to that of an organic body. Aristotle postulates that the semen possesses a living soul potentially, but this potentiality of soul can not become an actuality in the very semen for it

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<sup>5</sup> Devin Henry argues that the moving cause included in the semen could be considered in a twofold manner: on the one hand, the semen is moved by the male's nature, on the other it is moved by its proper motion (Henry 2005, 32). The father delivers motion to the semen, but he is not moves the embryo in a proper sense, for the moving cause of an embryo, although having been delivered from the father, becomes the internal cause of embryonic development from the moment of conception.

<sup>6</sup> John M. Cooper shows that the semen receives this movement from the movable blood. He also points out that there is not a single movement, but several ones, while a number of movements are contained not only in the male semen, but also in the female secretion. Cooper 1988, 15-16; 20-21.

needs an organic matter.<sup>7</sup> Therefore, the semen is not an ensouled body but is definitely a bearer of the soul.<sup>8</sup>

Thus, the semen is, on the one hand, an instrument to deliver motion, on the other – a material bearer of potentiality of soul. The function of semen is to deliver the soul to matter in the mother’s womb, while the matter of the male semen is not involved in the embryonic development (*GA* 737a 12-16; 18-23).<sup>9</sup> In such a way, the efficient cause unites with the formal one:<sup>10</sup> the cause ὑπὸ τινος communicates to the matter of an embryo through the semen and becomes a cause of its development and growth. This cause Aristotle calls soul: “By what are they [parts of embryo] formed? Either something external fashions them, or else something present in semen or seminal fluid; and this is either some part of soul, or soul, or something which possesses soul” (*GA* 733b31–734a1)<sup>11</sup>. The semen could be an efficient cause because it potentially possesses soul.

### 3. Embryogenesis. Generation of parts and soul of non-completed body

Aristotle argues, that there is no offspring’s part present in the semen, but the parts are formed after conception (*GA* 734a 36–734b3), not simultaneously, but successively.<sup>12</sup> Therefore, a semen delivers motion not to the entire embryo, but to the part that emerged first; it, in turn, imparts the motion to the next, etc.<sup>13</sup> The question is how are the emerged parts connected? Is it possible to suppose that, for example, the appearance and the shape of a liver are contained in the heart (*GA* 734a 21-33)? Aristotle responds that just as no part of the future body is contained in the semen, neither are the potentially nor actually; thus, no posterior part of the embryo is contained in the prior one. Hence we couldn’t say that one part is the cause of another, nevertheless, they appear one after another in a cer-

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<sup>7</sup> Cf. Code 1987, 56.

<sup>8</sup> Abraham Bos suggests that, for the semen, to be semen means to contain in itself a possibility of a soul, otherwise the semen is devoid of possibility to give birth and becomes semen in the same sense as a stone eye. Bos 2009, 386.

<sup>9</sup> Darovskikh 2017, 98.

<sup>10</sup> On the soul as formal and efficient cause, see Johansen 2012, 129 ff.; Code 1987, 54-55; on the soul as an effective cause in embryology see Gotthelf 1987, 217; Whiting 1995, 94. James Wilberding supposes that it is the contest of formal and efficient causes since although the semen contains a soul in possibility, it has its motion actually (*GA* 730b 15-22), Wilberding 2017, 35; 27, n. 17.

<sup>11</sup> Cf. Henry 2006, 282, Cooper 1988, 15.

<sup>12</sup> Cf. Wilberding 2017, 14; 20.

<sup>13</sup> In the generation of animal the first generated part is a heart, and this part is the starting point of growth. Bos 2009, 388.

tain order. The cause of this successive generation is the moving principle, which is transmitted from the father to the foetus through the semen. From the moment of conception, this moving principle becomes an internal cause of the movement, although it moves not the entire body (foetus is not yet an entire body), but each of its parts.

To clarify the successive generation of the parts, Aristotle takes an example of amazing self-moving automatons (τὰ αὐτόματα τῶν θαυμάτων) (*GA* 734b 7-19): when someone moves the first part of the device, the parts next to that are also set in motion, however, not all at once, but sequentially, one after another, so the movement is imparted from one part to another.<sup>14</sup> The parent, while staying in actuality, imparts the semen some moving force, but it further operates with no participation of the parent, being transmitted from one part to another. On the analogy of automatons, it is impossible to say that the parts appear one out of another, but they appear in a certain consequence due to the efficient cause transmitted from the father to the embryo through the semen. So, the semen is a bearer of the soul as an efficient cause and an instrument of nature.<sup>15</sup> It is also important that the semen, although possessing soul potentially, has the actual movement in itself (*GA* 730b 19-21). Since the moving cause is the one by which something potential (matter) becomes actual (bodily parts), it conveys a formal principle of generation.<sup>16</sup>

In this way, an embryo emerges not as an entire body, but as sequential parts, while it becomes complete only at the end of development (*GA* 736b 1-5). At the same time, Aristotle claims that the first part of an embryo is ensouled (*GA* 734b 22-27), and the sequential parts emerge and move as long as the soul operates within that embryo. For this reason, matter of an embryo is organic, while the embryo itself and its parts possess life: the embryo grows and takes on nutrition, which specifies it as a living being.

The body of an embryo emerges part by part. Speaking of life and soul, Aristotle draws an analogy with the emergence of a body: the soul of an embryo also emerges part by part. Aristotle affirms that at first the foetus lives a vegetative life. Thereafter, as the body of the embryo develops and becomes suitable for an animal soul, the animal soul emerges as actuality of the body (*GA* 736a35–736b1).

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<sup>14</sup> For examination of the Aristotle's automatons and other ancient devices as an example for embryogenesis see: Henry 2005, 29 ff. He also notes that for Aristotle the ideal example of embryogenesis would be a self-moving automaton, which has the prime source of its movement in itself (Henry 2005, 39).

<sup>15</sup> As an efficient cause of embryogenesis the semen is equivalent to the nature. See Henry 2005, 30.

<sup>16</sup> Darovskikh 2017, 106.

Thus, in describing the animation of an embryo, Aristotle points out two important things: first, the embryo generates not as a whole, but as sequential parts, and becomes an entire body only after the development is completed; second, the embryo possesses life from the moment of conception, but it does not possess an animal or human soul, but it receives a vegetative one. In the course of embryonic development, not only the body but also the soul emerges part by part.

#### 4. Parts of the soul and unity of an emerging body

Here, it is important to return to the definition of soul as the cause of life as well as of various types of corporeal activity. Aristotle explains corporeal activity, first, as the actuality of parts or capacities of soul (δυνάμεις τῆς ψυχῆς or μόρια τῆς ψυχῆς) and, second, as the movement of an organic body. By that, the structure of a body as well as that of a soul is determined by the nature of a living being. The nature limits the set of capacities and functions which a creature of a given natural kind can have. For example, a tree can turn green and yellow, while a man can walk, but not vice versa. The nature of the species limits the set of capacities and functions which a creature of the given kind can have. Since the parts of soul are the actuality of bodily functions, prior to speaking of the soul parts, I will briefly describe Aristotle's view on the composition of organic unity.

##### 4.1. Unity of body. Types of composition of matter

In *De partibus animalium* Aristotle refers to three types of composition that makes up organic matter: composition of *homoeomerous* things (blood, bones, flesh) from elements; composition of organs and bodily parts from *homoeomerous* things; composition of the whole body from organs and parts. Although Aristotle speaks of parts of animals, plants also have these levels of composition (*PA* 646a 12-23). All three levels of composition are organized so that the matter on each level possesses its own form and actuality (there is the actuality of meat, bone, blood, heart, eye and so on), but the actuality of each part is impossible separately from the entire organism (Cf. *PA* 640a 18-19). In this way, blood, bones and flesh have their own form and their own movement. The actuality of blood is its motion in a body; while ceasing to be a part of the whole, blood not just loses its motion, it stops being blood. The same occurs on a higher level. An eye devoid of the faculty of seeing, or separated from the whole, is an eye only by name and it is deprived not only of the motion proper to an eye, it is deprived of its essence. The same is correct for any bodily part; e.g., a hand devoid of faculty to grip or separated from the whole is a hand only by name. It is important that each bodily part, whether blood, eye or hand are effective only as a part of the whole and only while the whole itself is effective, that is, while it is alive. Each part itself bears its

own essence and activity, but the activity of each part is a matter or possibility for the actuality of an entire body. On the other hand, blood, heart and eye are the matter of the entire organism only inasmuch as they themselves are in motion. The total actuality of all bodily parts at all three levels of composition of matter is called life, while a body having active parts has life potentially (for there are no active parts in a corpse and it has no life at all). But this life as an activity of all the bodily parts and organs exists as long as the entire organism is ensouled.<sup>17</sup>

This account allows us to understand more precisely the connection between soul and body. Namely, the soul is not just a form of body on the analogy to that of a table where we can simply distinguish between matter and form or actuality (the last suggests that somebody seats, dines, reads etc. at the table), but it relates to the body in a complicated way. While being the form and the actuality of body, the soul is simultaneously the form and the actuality of all its parts and all levels of its composition. That is, on the one hand, the soul as the essence of a body is simple, nevertheless, as long as the soul is an actuality of a bodily structure which organizes body into a living unity, the simplicity of essence is overturned onto the material complexity and the soul itself acquires a certain structure. The structure of a soul is described in the doctrine on parts or capacities of soul.

#### 4.2. *Parts of soul*

Aristotle often takes “capacity” and “part” as synonyms, and speaks mostly of capacities, but it seems that it is possible to separate these two meanings. There are three parts of soul: nutritive, sensitive and rational, with a number of capacities in accordance with each part. The nutritive soul constitutes the first level of life, for all the living things feed themselves. The nutritive soul is the entelechy of plants, each plant has its organs whereby it is capable of nutrition, growth and reproduction. Alongside that, the nutritive soul constitutes the basis without which the being can not be called living, for all the living things feed themselves, grow and are able to reproduce. For this reason, the capacities of the nutritive soul are presented both in an animal and in a human being. The sensitive soul is the actuality of an animal, but a human also has the capacities of a sensitive soul. In the correlation of three parts of soul a higher part includes the lower one as matter and potentiality and at the same time cannot exist without it. The nutritive soul is able to act on itself, the sensitive soul does not act without the nutritive one, etc. (*DA* 414b32–415a6). It is possible to draw a parallel with the three

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<sup>17</sup> The body having no soul does not possess unity and life neither in possibility nor in actuality and, then, it is a body just by name, like Aristotle speaks of corpse and eye. In other words, being ensouled does not come after the possibility of life in a body, but one consists with the other. Cf. Whiting 1995, 94-95.

levels of composition of matter: the higher level of bodily composition does not exist without the lower one. In a living body, however, all three levels of material composition should be represented at once, whereas it is enough but one capacity of soul for actual life (*DA* 414a 29-34; 415a 25-30). That means, actuality of any capacity of soul, even if it is the only one, needs the organic complexity.

Therefore, the capacities of soul are not parts of soul as a form, but the capacities of an ensouled body. Accordingly, these are the principles of certain bodily functions. The capacities of soul exist as a form of corporeal structure<sup>18</sup> and as a cause of activity of certain bodily parts.<sup>19</sup> Depending on the nature of species, the same functions are performed differently by different organs, so the soul is connected with a corporeal matter suitable for it, wherein, by the means of the very soul, the organs are figured necessary for its motion.<sup>20</sup> Depending on the nature of species, the same bodily functions are performed differently by different organs, so the soul belonging to this species, is connected with the corporeal matter suitable for it, wherein, by the means of the very soul, the organs are figured necessary for its functioning.

#### 4.3. *Parts of soul as a cause of embryogenesis*

Thus, the semen delivers motion to the first emerged part, then this part gives motion to the next etc. Meanwhile, each of the parts generates as an ensouled one (*GA* 734b 24-27). Generally, the body having life potentially should be ensouled: for body without soul has not any life even in potentiality. The bodily parts are composed of elements, but there is no principle of why one is flesh while the other is bone in the matter itself. Flesh and bone are produced by the movement coming from the begetter while the last exists in actuality. So, bodily parts generate one after another in a certain consequence, but none of them is contained in the other and does not emerge from the other (*GA* 734a 29-36). Similarly, no part is a cause of generation of another part: it is not the heart that causes the liver to be, but the efficient cause which is transmitted from one part to

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<sup>18</sup> In the *De motu Animalium* (703a14-36), Aristotle affirms that the soul as a cause of life is placed in the heart, while the remaining parts share life as long as they are connected with the heart. Diana Quarantotto argues that the theory of the heart as a place for the soul allows to consider the living body as an organic structure whose activity is possible only when its parts are ordered to the center. The heart's activity unifies the organism into one living entirety, nonetheless, the cause of the heart's activity, as well as activity of the other parts, is the soul. Quarantotto 2010, 52-53.

<sup>19</sup> That is why we are entitled to say that the capacities of a soul specify the soul as the cause of life. See: Johnston 2011, 196.

<sup>20</sup> Cf. Quarantotto 2010, 52-53.



another and the matter provided by the female. The soul is a totally different case: the more perfect parts of it are potentially contained in the less perfect ones. A more perfect soul “emerges” from a less perfect one, whereas the external matter, provided by the female, serves as an instrument to construct the body (*GA* 740b 24-36).

Each part of an embryo emerges as matter of the soul. The soul of an embryo is both formal and effective cause of development, and the body develops stage by stage under its effort. The nutritive soul is the actuality of all the parts of an embryo until it did not receive the capacities of an animal. During this period of development, the actual nutritive soul is the cause of unity and life of the embryo. The embryo is not a whole thing, it is rather considered as a set of emerging parts, along with that, as an ensouled being it has its actuality and unity, but at that stage of development an embryo is united as a plant. This “plant”, i.e., the embryo living as a plant, distinguishes from the real plant in that it is an animal or a human being in potentiality, which suggests that it has the nature of an animal or a human being, and its body develops in accordance with its own nature.<sup>21</sup> Although being in potentiality belongs to matter, the possibility for a higher life is contained not in the body of the embryo, but in its soul, for the nutritive soul as actuality of the embryo contains potentially the sensitive one. Upon a certain period of growth, it acquires relative animal parts, its body also becomes the capacity for sense perception and, as the actuality of this corporeal matter, sensitive soul emerges. Now the sensitive soul is an efficient cause of further development, while the nutritive soul becomes a possibility: as actuality of certain parts and functions responsible for nutrition and growth, it remains a part of ensouled organism, but already as a part, not as a whole.

### 5. Soul as an instrument and the End

Still there is a question on how a less perfect actuality like vegetative soul contains within itself a possibility of a more perfect one. In order to answer the question, one should turn to considering the End of generation. Aristotle says that there are three causes of generation: “The End, which we describe as being that for the sake of which <other things are>; the things which are for the sake of the

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<sup>21</sup> It is more probable that also in the semen, just as in the foetus, not only vegetative, but animal and human souls (if it is spoken of human semen) is potentially contained. Cf. Henry 2006, 283-284; Wilberding 2017, 27 n. 17; Bos 2009, 390. Bos believes that the semen contains in potentiality all the soul parts which successively become actual, while the semen which does not include in potentiality the animal soul can not be the cause of generation. See Bos 2009, 386.

End, viz., the activating and generative principle...; the things which are serviceable, which can be and are employed by the End" (GA 742a 28-36).

Thus, Aristotle distinguishes the End of generation, the effective or activating cause, which exists for the sake of the End and the instrument which is employed by the End. The End is understood as an actuality and entirety of an animal and the eternity of its natural kind<sup>22</sup> (DA 415a 29-30). The instrument is matter, however, not matter in general, but, on the one hand, the matter of a semen (GA 737a 7-8) whereby the moving cause is delivered to an embryo,<sup>23</sup> on the other hand, the generated parts as the matter of its soul. The efficient cause is transmitted from the father through his semen,<sup>24</sup> the movement of that semen results in emergence of an ensouled part. With its emergence, this ensouled part immediately becomes the part of the End (DA 415a 29-30): first, as a part of yet incomplete living being; second, as something containing in itself a possibility of perfection, third, as something containing in itself the movement from the father who has a nature of its kind in actuality. Aristotle declares that the first part of embryo possesses a nutritive life, but includes in itself the beginning and the End of the given nature.<sup>25</sup> For this reason the first part includes potentiality of the soul which accomplishes its nature, that is, the sensitive soul, once we speak of an animal, and the rational soul, when we argue about a human being. The possibility of soul as a formal principle is contained in the semen, then, at conception, this soul starts acting as nutritive one and becomes the cause of movement, growth and development of the foetus, while the ensouled parts of foetus include in itself a sensitive soul in potentiality. When the body is grown to a certain level it receives the sensitive soul, while the nutritive soul becomes its capacity or potentiality, that is,

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<sup>22</sup> Cf. Preus 1977, 78.

<sup>23</sup> Sabina Foellinger accounts the semen as an instrument in correlation with an end of generation. Though the semen is not an ensouled body, it differs from non-organic matter, so it could be named living as distinct from, e. g., stone. Foellinger 2010, 231.

<sup>24</sup> The natural *eidōs* of the father determinates the order of generation of an embryo from beginning to the End. John Cooper suggests that the form of father is the cause of both specific similarity and corporeal structure (Cooper 1988, 15 ff.). It could be suggested that the actual nature of the parent is not just a moving and formal cause but also a paradigm for the development of an embryo. According to Simplicius, this is the way Alexander reads Aristotle: the father contains within himself both the efficient cause and the paradigm of generation. See Simplicius, *On Phys.* 310,25–312,1.

<sup>25</sup> According to Devin Henry, Aristotle considers the generation of the embryo as a single continued movement but not as a number of discrete movements, see Henry 2005, 36-37. He also understands the nature not as the End, but rather as a united possibility lying in the fundament of a complicated process of generation. See Henry 2005, 40.

it no longer exists as an actuality of the entire body, but as an action of the nutritive organs.

The soul of the embryo is defined as a logos of emerging parts and an *eidos* of its matter, and such definition concerns the soul both as an efficient cause and as an essence of completed body (DA 415b 7-15). On the one hand, the soul is the logos and actuality of the emerged parts, that is, the principle of life and movement for unperfected body. As a moving cause the soul becomes also a formal principle of generating parts and operates an order of corporeal development. On the other hand, as a natural *eidos* and essence of entire animal the soul remains potential during the development of an embryo. The End of embryonic development is the actuality of its natural essence.<sup>26</sup> The final cause determinates the order of embryonic development and operates as a series of perfected activities, while the ensouled parts of the embryo are considered as the instrument of that cause. As for the very parts of the soul, they, being an actuality of each development stage and a moving cause of the further generation, become a part of the natural final cause, for they contain in themselves the End as a possibility.<sup>27</sup>

The soul as essence, entelechy and cause of the unity is a basis for capacities of ensouled body,<sup>28</sup> while the parts of a soul relate to it not as parts, but as capacities, and due to that the soul of body is the entelechy of all its parts at once. The same could be asserted on the body of the embryo: the soul is a cause of embryonic life because on any stage of its development the soul is the actuality of all its generated parts at once, which means that it is the cause of unity of unperfected body.

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<sup>26</sup> Cf. Gotthelf 1987, 225–226; Quarantotto 39, 43–44; Matthen 2010, 39; 43–44.

<sup>27</sup> Cf. Bos 2009, 392. Abraham Bos considers the parts of soul as stages of actualization of the entire soul of body.

<sup>28</sup> Cf. Sorabji 1974, 64, Johnston 2011, 197.

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