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Material Causes and Incomplete Entities in Gallego de la Serna’s Theory of Animal Generation

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Abstract

This article examines some aspects of the natural philosophy of Juan Gallego de la Serna, royal physician to the Spanish kings Philip III and Philip IV. In his account of animal generation, Gallego criticizes widely accepted views: (1) the view that animal seeds are animated, and (2) the alternative view that animal seeds, even if not animated, possess active potencies sufficient for the development of animal souls. According to his view, animal seeds are purely material beings. This, of course, raises the question of how living beings can arise from inanimate matter. Gallego is aware that two other thinkers who understood animal seeds as purely material beings, Duns Scotus and the Louvain-based physician Thomas Feyens, did not solve this problem. Gallego’s solution makes use of the notion of incomplete entities developed by the Spanish Jesuit Francisco Suarez. While Suarez applies this notion to soul and body in order to explain why souls have a natural tendency towards organic bodies and organic bodies have a natural tendency towards souls, Gallego applies this notion to the natural tendency of animal seeds towards each other and towards further substances in their respective environment. In his view, this natural tendency of animal seeds to incorporate further substances explains that origin of material structures complex enough to constitute an animal soul.

1. Introduction

The contribution of late Scholastic thought to the development of the early modern life sciences has not received much attention in the recent growth of interest in the history of the early modern life sciences and its relation to philosophy. One exception is Gómez Pereira (1500-c. 1558), whose theory of animals as inanimate machines strikingly anticipates some traits of Descartes’ natural philosophy.[[1]](#endnote-1) But Pereira was by no means the only innovative late Scholastic contributor to issues in the life sciences. Some quite different, but no less interesting material concerning animal generation is to be found in the work of Juan Gallego de la Serna, royal physician to the Spanish kings Philip III and Philip IV.[[2]](#endnote-2) While Gallego accepted the traditional view that animals possess an animal soul, he nevertheless attacked two other, widely accepted views: (1) the view that animal seeds are animated,[[3]](#endnote-3) and (2) the alternative view that animal seeds, even if not animated, possess active potencies sufficient for the development of animal souls.[[4]](#endnote-4) Thus, even if Gallego’s view of the nature of animals is much less radical than those of Gomez and Descartes, his view of the nature of animal seeds diverges radically from what almost everyone else believed in his time.

For someone who accepted a Galenic two-seed theory of animal generation, as did Gallego, both the view that animal seeds are animated and the view that they possess active potencies sufficient for the development of animal souls pose a deep problem. Suppose that seed souls are immaterial entities (an assumption made, for example, by Gallego’s prominent contemporary Daniel Sennert). Such a supposition seems to present no problem concerning the persistence of these souls across the process of conception. However, there seems to be one soul too many in the fetus, and some (probably implausible) argument has to be provided to explain why only one of them functions as the soul of the nascent animal. Alternatively, suppose that animal souls are features of the material organization of seeds, such as the temperament of primary qualities. On such a supposition, it seems conceivable that once the matter of the two seeds is all mixed together and then mixed with menstrual blood, the temperament of this mixture would function as the soul of the nascent animal. Thus, there would not be too many souls in the fetus. However, there seems to be a problem regarding how the temperaments of the seeds could be understood as persisting in the temperament of the mixture of seminal matter with menstrual blood. It would rather seem that the temperaments of the seeds have ceased to exist and an entirely new temperament has come into being.

Indeed, the view that animal seeds are nothing but material causes of animal generation is not entirely unprecedented. Gallego points to two predecessors whose ideas he partly accepts. One of them is Duns Scotus (1265/66-1308); the other is Gallego’s contemporary Thomas Feyens (1567-1631). Scotus’s influence on other areas of early modern thought such as philosophical theology is well known. Still, his influence on early modern theories of biological reproduction has not found much attention from commentators. This is regrettable because Scotus presents some intriguing arguments to show why it does not make sense to suppose that substantial forms of seeds can persist across the process of conception. Accordingly, he suggests that animal seeds are not animated by vegetative or sensitive souls but rather possess substantial forms that function as transitional, “intermediary” forms that are neither souls nor persist in the fetus. Feyens agrees that the active powers of seeds cannot be understood as powers identical with the active powers found in the fetus and adds to Scotus’ metaphysical arguments some arguments drawing on the medical tradition. Gallego finds this line of thought attractive; in section 2, I will outline the arguments that Gallego shares with Scotus and Feyens.

Yet, neither Scotus nor Feyens presents an explanation of the origin of vegetative and sensitive souls in terms of natural processes. Scotus explicitly invokes divine agency to fill this explanatory gap, while Feyens does not offer any explanation. It is this explanatory gap that Gallego tries to fill without having recourse to God as a primary cause. To be sure, Gallego accepts the view that God should be understood as a concurrent cause of all natural events that preserves the existence of the primary causes.[[5]](#endnote-5) But he suggests that two ideas can explicate the nature of primary causes relevant for sexual reproduction: (1) The theory of matter and form as incomplete entities developed by the Spanish Jesuit Francisco Suarez (1548-1617); and (2) the Galenic view that the uterus possesses a formative faculty of its own. In section 3, I will explore how Gallego modifies the theory of incomplete entities to explain how animal souls can be “educed” from the potencies of matter. In section 4, I will examine how Gallego uses the idea of a formative power of the uterus to fill out the abstract framework of a theory of incomplete entities with some concrete physiological mechanisms.

2. Seeds as Material Causes

Gallego is a highly eclectic thinker whose own, quite innovative proposals are made against the background of the acceptance of numerous elements in the thought of his predecessors. This is why this section and parts of the two following sections will have to trace not only Gallego’s own views but also the views of others that he builds upon. Gallego makes it clear that what is interesting about Scotus’s position is the thesis that an animal seed is neither a “primary active cause of substantial formation” nor an “instrumental active cause of substantial formation” but rather only a “material cause of substantial formation” and an “efficient principle of preliminary dispositions.”[[6]](#endnote-6) This characterization is somewhat confusing because it both ascribes and denies some active potency to the animal seed. The appearance of confusion, however, quickly dissolves once one realizes that the active potencies at stake are distinguished by the differing natures of their effects. Some active potencies are those that lead to the generation of substantial forms. It is this kind of active potencies—be it primary (that is, active due to its own nature) or instrumental (that is, active by virtue of the agency of another being)—that Scotus excludes from animal seeds. An active potency of a different kind is that which leads to the generation of something other than substantial forms. It is this kind of active potency that Scotus uses to explicate the Augustinian notion of “seminal reason”: “In such a seed, there is some internal active power by means of which the seed is changed uniformly, as from a particular cause … And this active quality, which the seed has from the progenitor, is the seminal reason.”[[7]](#endnote-7) Even if the effect of such potency is not the substantial form of the fetus, it is by no means inessential for the process of animal generation: The “seminal reason” is an “active quality induced into the seed, which is determinate and follows from a determinate form which is in the seed and transmutes it towards a determinate form.”[[8]](#endnote-8) In the sense that it changes the matter of the seed in such a way that the matter becomes capable of sustaining a substantial form, the effect of the active potency in the seed can be characterized as a “preliminary disposition” with respect to the animal that is generated.

Nevertheless, for Scotus the form of the seed is an intermediary form in the sense that it ceases to exist once conception has taken place, and once the “seminal reason” is corrupted only some accidental organization is preserved. This is why he answers the question of whether this active quality is active in substantial generation in the negative.

Because as the substantial form of the seed decays, so does this active quality that follows the substantial form; hence, in the moment of corruption it does not generate, because then it does not exist, no more than the form of the seed from which it follows …[[9]](#endnote-9)

In this sense, the effect of the active powers of a seed is limited: “[T]he active power in the seed is only capable of changing—not generating—substantial form; if something of the seed remains, it is less perfect than form.”[[10]](#endnote-10) This is why Scotus holds that, even if active potencies of the seed can be characterized as arising from the substantial form of the seed, the substantial form of the seed cannot be regarded as what generates the form of the living being. With respect to the living being to be generated, the seed is not a formal cause, but only a material cause.

The radical nature of Scotus’ proposal can be measured by the fact that only very few early modern thinkers took up this line of thought. One notable exception is the Louvain-based physician Thomas Feyens. Feyens is better known for his contributions to the theory of monsters, and in particular for his claim that some malformations are due to maternal imagination.[[11]](#endnote-11) However, while he invokes imagination for the acquisition of some traits, he does not take imagination to be responsible for the origin of the soul of the fetus.

Feyens considers several accounts of the origin of the soul of the fetus, all of which he deems to be unsatisfactory. He argues that it cannot be a power of an absent soul because powers cannot wander from one subject into another. He also argues that it cannot be a merely physical power. This is why:

[I]f it were such a power, it would follow that the formation and change of the seed in the uterus were not vital actions: which is absurd … The first premise is proved as follows: because from a non-vital power there cannot proceed a vital action. The second premise is proved as follows: because, what could be said more absurd than that the function of the seed in uterus is not an action of life? For the same power the change of the seed towards the nature of bone and flesh comes about as the one from which formation arises: for at the same time as the fetus begins to be formed, it begins to be nourished and to grow.[[12]](#endnote-12)

Of course, a widely held view in medieval and early modern medical theory had it that the presence of vital processes from the moment of conception onwards indicates the presence of souls in the seeds. Feyens rejects this view and he does so in a way that goes significantly beyond Scotus, using a group of specifically medical arguments:

Neither blood nor spirits are animated. Hence, nor is seed. The premise I assume on the basis of the common doctrine of all physicians … The conclusion is proved as follows: Why would seed have to be more animated than those? They are produced in much more noble organs than the testicles; namely, in the brain, heart and liver; and if these are incapable of impressing a soul onto blood and the spirits, how could the testicles do this? Milk is produced in the third concoction in glandulous parts, in external parts, and is not animated: but the testicles are such parts: therefore, the seed that is generated in them can no more be animated than milk. Likewise, physicians deny a soul to spirits and blood because they are fluid bodies, not cohering with a whole, in no way organic, having no determinate magnitude and boundary of their substance. But seed is a body of this kind … [[13]](#endnote-13)

Thus, it is the analogy between semen and other bodily fluids that are taken to be inanimate in the medical tradition that speaks against ascribing souls to seeds. Gallego’s attitude towards these aspects of the thought of Feyens is clearly affirmative. But he takes Feyens’s line of argument one step further by considering the reason why blood and milk are not animated. What matters, in his view, is the distinction between concoction and nutrition:

The task of concoction in the precise sense is not to transmute ailment into the substance of what is nourished. For this latter task is the task of the power of nutrition; because the task of concoction is to assist and to prepare ailment for the nutritive power itself; and the task of the nutritive power is to animate it through and through. [[14]](#endnote-14)

As Gallego explains, “the concocting power provides the assimilation of all parts of the ailment by educing from their potency some form that is intermediary between the vital form of this part, and the form that existed before in the parts of the ailment; this intermediary form is … the ultimate material disposition towards the vital form.”[[15]](#endnote-15)

Obviously, there is strong agreement between Scotus, Feyens, and Gallego with respect to the conception of animal seeds as merely material causes of generation. In spite of his agreement with the analysis of animal seeds as merely material causes of generation, Gallego is aware that neither Scotus nor Feyens are very strong on the issue of the origin of the substantial forms that they ascribe to living beings. In Scotus’ view, inanimate forms are induced by the form of the heaven. But since he takes the form of the heaven to be inanimate, he does not invoke this explanatory pattern for the origin of the forms of living beings. Rather, in his view vital forms are induced into the mixture of the seed and menstrual blood immediately by divine agency.[[16]](#endnote-16) Likewise, with respect to human souls, Feyens accepts the doctrine that they are induced by divine agency. But Feyens does not come forth with any explanation of the origin of the souls of non-human animals. Gallego is not happy about this explanatory gap because he demands that the origin of the substantial forms of animals be explained through purely natural powers.

With respect to Feyens, he believes that the explanatory gap arises from an inadequate analysis of the role of material dispositions for the reception of substantial forms. Feyens’s thesis is that “organization is not a disposition prior to the introduction of the soul.”[[17]](#endnote-17) This is why: “Being organic is nothing but being figured in this and that way; and organization is nothing but such and such a mode of figure in a subject and its parts: but figure is not a necessary disposition for the reception of natural forms …”[[18]](#endnote-18) Understanding material dispositions in this way lends plausibility to the claim that there are various forms that are indeed independent of a particular disposition of matter:

The forms of elements, forms of stones and metals are introduced into matter without any form. The real accidental forms such as heat, cold, light, rarity, density, softness, hardness, heaviness, lightness, color, taste, smell, and intentional forms such as the species of color, sound, smells, etc. all are received in the subject without that it be required that in the subject there is found any determinate figure and that all are indifferent to all figures; hence also the soul does not need it for its reception.[[19]](#endnote-19)

As Feyens suggests, the relations of the soul to matter should be understood in analogy to the relation of these forms to matter. With respect to determinate figures of bodies of living beings, Feyens confirms this insight through a further consideration: “The figure of the body of living beings is the effect of the forms that exist in them; hence it is not a disposition prior to the forms … [F]or a disposition is prior to the form, an effect posterior to it; but nothing can be prior and posterior at the same time.”[[20]](#endnote-20)

By contrast, Gallego takes the theory of animal seeds as merely material causes to imply that the seed has only received some material dispositions for the reception of the soul and the function of the parts of the fetus.[[21]](#endnote-21) Moreover, in his view an adequate solution to the problem of the role of material dispositions in animal generation will lead to an answer concerning the problem of the origin of animal souls. In his view, Suarez’s theory of matter and form as incomplete entities is exactly what can provide solutions to both problems.

3. Material Causes and Incomplete Entities

Suarez maintains that material dispositions co-operate actively in the production of substantial forms. This is his argument:

An accident that is proportional to a substantial form can by its own nature be a suitable instrument for this task; for, even if with respect to its entity an accidental form is inferior compared with a substantial form, with respect to its way of being it has a proportion to it, if both depend on matter: and likewise they are commensurable with respect to disposition and form, and for the same reason they can be regarded as proportional with respect to instrumental power and action, as well as end. For, as it belongs to the nature of a substance to operate through accidents that are proportional to it, it belongs to the nature of a substance to come into being through accidental dispositions that are proportional to it …[[22]](#endnote-22)

Suarez calls a form of the type that he has in mind here a “material form”; and what is special about such a form is that it “depends in its being on matter.”[[23]](#endnote-23) But matter, too, in a certain sense depends on material form, and it is the concept of mutual dependence between matter and form that lies at the heart of Suarez’s conception of matter and form as incomplete entities:

[The union of material form and matter] insofar as it proceeds from form, is a medium or relation through which due to the form matter is actualized and a composite is put together; and in this way it is said to be the causality of form; but insofar as through this union the form adheres to matter and is sustained by it, it is a dependency of this form on matter. For there is such an intrinsic connection between such a form and union that they mutually depend on each other in different respects. [[24]](#endnote-24)

What are the “different respects” that Suarez has in mind here? As to the dependence of form on matter Suarez accepts the Scholastic view that “form necessarily requires a disposition of matter for it to be able to confer its formal effect.”[[25]](#endnote-25) But he maintains that the question of what the required disposition consists in can be answered only through a treatment of the relation between prime matter and quantity.[[26]](#endnote-26)

In a recent work of commentary, Suarez’s views on prime matter have been portrayed as being in great agreement with Aquinas’s. It has been suggested that, for Aquinas and Suarez alike, prime matter (1) does not possess any active properties; (2) does not possess quantity; and (3) does not possess any qualities following from quantity.[[27]](#endnote-27) Such an interpretation is highly inaccurate. It overlooks the fact that Suarez takes up Averroes’s view that prime matter itself is capable of bringing forth extension, even if by itself it is incapable of defining spatial boundaries between individual things.[[28]](#endnote-28) In fact, in Suarez’s view, there are two possible ways in which prime matter could be thought of as bringing forth quantity: Either quantity is a necessary affection of a purely passive potency;[[29]](#endnote-29) or prime matter—even if it does not act on other beings—can have an intrinsic capacity of bringing forth qualities by means of emanative causation.[[30]](#endnote-30) Moreover, if prime matter is capable of bringing forth quantity, it is capable of bringing forth qualities that follow from quantity. This is suggested by the following passage:

It is certain that simple substances that persist by themselves suffice to receive or materially cause accidents that are proportional to themselves … When we say that these substances are by themselves sufficient for this, we do not exclude that they can materially cause one accident by means of another …

Here, Suarez distinguished between different levels of material accidents. Moreover, all accidents that are caused by first-level accidents are understood as being brought forth by the substance that brings forth the first-level accidents. Thus, if prime matter is able to bring forth quantity, all accidents caused by quantity can be said to be brought forth by prime matter. In this sense prime matter can produce material accidents.

By contrast, Suarez argues that material accidents cannot be caused by material forms alone. This flatly goes against the Thomistic view that ascribes both quantity and the qualities following from quantity to the union of matter with form. Suarez rejects this view because he believes that the substantial forms capable of informing matter lack subsistence on their own: “It is also certain that substantial forms that cannot subsist naturally are unsuitable to cause materially accidents by themselves alone: because what does not subsist in itself cannot support something else …”[[31]](#endnote-31) This is the basic idea of Suarez’s conception of substantial forms as incomplete entities—they are incomplete in the sense that they could not exist independently of some portion of prime matter that they inform. Suarez’s argument for why substantial forms alone are incapable of bringing forth material accidents, however, is vulnerable to the objection that prime matter, no less than substantial forms, is incapable of subsisting by itself. In fact, Suarez acknowledges the dependence of matter on form, and there is a sense in which he regards prime matter, too, as an incomplete substance. Importantly, however, he distinguishes the structure of the dependence of matter on form from the structure of the dependence of form on matter:

matter has partial subsistence, hence it has some entity such that it can sustain some accidents … the dependence of matter on form is not the one true and proper cause of this piece of matter but only a cause that is naturally necessary for the preservation of matter; this kind of dependence, however, which is extrinsic to the entity of matter … does not prevent the entity of matter from being sufficient for sustaining accidents in the category of material cause.[[32]](#endnote-32)

Thus, the dependence of matter on form does not exclude a sense in which matter possesses a kind of subsistence sufficient to sustain quantity. Still, material accidents not only depend on the subsistence of prime matter; they also, in a different sense, depend on the activity of substantial form: “Although quantity can be said to depend in a mediate way on the soul, insofar as matter depends on the soul, nevertheless this dependence is sufficiently replaced by the subsequent form …”[[33]](#endnote-33) Most plausibly, what Suarez has in mind here is the Averroistic insight that determinate quantity depends on the presence of a substantial form. This conjecture is confirmed by his claim that matter cannot receive quantity “unless it is determined by form.”[[34]](#endnote-34) At the same time, the partial subsistence of prime matter implies that a determinate quantity does not depend on the presence of a particular substantial form. Any substantial form of the right type would do. In this sense, one substantial form can be replaced by another substantial form of the right type.

The upshot of Suarez’s view is that there is a “mutual dependence and priority” of quantity and form:

[Q]uantity and form can depend on each other in different material respects. For even if form with respect to matter is a formal cause, with respect to quantity, it is reduced to a material form … because it behaves like a disposition of matter such that matter can sustain quantity. Nor is it unsuitable that dispositions relating to different respects should have such a mutual dependence among each other, both because they are directed towards different formal effects that, under different headings, are necessary for the subject, as well as especially because they do not have this mutual order among each other immediately but with respect to the subject for whose being they are necessary. [[35]](#endnote-35)

Gallego agrees with Suarez’s general insight into the mutual dependence between quantity and form. Still, he believes that Suarez has not succeeded in fully explaining why matter cannot receive naturally a form unless it is extended. In his view, this is so because Suarez did not provide a fully satisfactory analysis of the notion of formal causation. As Suarez suggests, the causality of form is nothing other than the “actual union of form to matter” such that “the composite is the ultimate effect of this causality.”[[36]](#endnote-36) But while his view of formal causality makes clear why form is incomplete in the sense of being unable to exert formal causality without primary matter, it falls short of explaining why formal causality requires primary matter that is already extended due to its own (passive or active) potencies. The idea of formal causation as union of form and matter seems perfectly compatible with the idea that extension is produced, not presupposed by such a union. Moreover, the nature of this union remains puzzling. Clearly, only being where a portion of matter cannot be enough for union because then no composite substance would arise.

Gallego tries to remedy the shortcomings in Suarez’s argument by using an alternative analysis of formal causation, an analysis that puts the nature of the activity of substantial forms at center stage. His basic insight is that it does not make sense to talk of a union of form and matter unless form acts upon a portion of matter. Gallego finds support for such a suggestion in Aristotle’s *De caelo* II, 8, where Aristotle points out that heavenly bodies lack organs of animal motion but have the adequate shape for the motion specific to them (290a30-35). Gallego takes this passage to imply that “no created being has being for its own sake, that is, has being only for the sake of being, but it has being for the sake of operation; and the operation … is more powerful and more useful than mere being, which is why it happens that the being of no created being can exist even for an instant without the action of organs.”[[37]](#endnote-37) Correspondingly, Gallego objects that “no substantial form unites with a body only for the sake of union but for the sake of carrying out some of its actions; hence, the soul unites with the body not for the sake of its first actuality, which is the substantial union, but rather for the sake of its most important and ultimate end.”[[38]](#endnote-38) And, as he emphasizes, in the case of animal souls this ultimate end consists in organic actions.[[39]](#endnote-39)

Thus, for Gallego the production of substantial form requires two factors: (1) a specifically organic disposition of matter that is the outcome of the quantitative characteristics of prime matter, and (2) an external agent that produces a natural form-matter-composite. We will have to look into Gallego’s views on the nature of this external agent and its mode of operation in the following section. For now it is important to get a grasp of the characterization that Gallego gives of the substantial forms generated in this way. With respect to the substantial form that at an initial stage animates seminal matter, Gallego is clear that it must be a kind of vegetative soul.[[40]](#endnote-40) He distinguishes such souls both from the merely natural and the entirely spiritual forms, but he is never very explicit as to the nature of vegetative souls. However, he notes that Galen identifies the potency capable of bringing forth change in an already formed organism with the temperament of primary qualities.[[41]](#endnote-41) As Gallego suggests, the formative faculty of the fetus, too, could be understood as something that “follows” the temperament of primary qualities.[[42]](#endnote-42) Moreover, he is explicit that due to their relation to body parts animal souls are themselves quantitative entities:

[I]n order to be able to inform some body … it is not enough that the soul be simply a quantum, but it is necessary that it actually has the same extension of quantity as is necessary for the secondary actuality of the form.[[43]](#endnote-43)

This conception has far-reaching consequences involving the mereological structure of animal souls. Contrary to the widely accepted doctrine that the soul is whole in the whole body and whole in each of the body parts, Gallego holds that the relation of animal souls to animal bodies is more complicated. There is, in fact, a sense in which he believes that the soul is related to the whole body: “each soul requires a whole that is indivisibly prepared in the way described, as the adequate being that can be perfected, because it is proportional to the whole and not the single parts …”[[44]](#endnote-44) The relevant sense in which the body is an indivisible whole can be gleaned from Gallego’s acceptance of Galen’s notion of instrumental cause: According to this notion, single body parts fulfill specific functions, but they do so in the mode of “instruments,” that is, their agency depends on the agency of other body parts. An organic body forms a whole in the sense that the proper operation of one body part depends on the proper functioning of some other body parts, and vice versa.[[45]](#endnote-45) In this sense, an animal soul requires an organic body that is a genuine whole. At the same time, specific bodily dispositions correspond to specific functions of the soul:

[T]he whole soul is educed from the whole body, but in such a way that each of its parts is educed from the part of the body to which it is said to have an aptitude, due to the suitable disposition of this body part. For as the whole material soul is said to have a relation to the whole body through the variety of dispositions of a shared nature, so is each part of the form said to have a relation to one particular part of the whole body, due to a singular disposition and a partial distinction from other parts of the same body … [[46]](#endnote-46)

This is why animal souls “are accidentally quantitatively extended according to the parts of the whole, in which they are not simply but in a diminished, secondary way, or in a certain respect; and so it comes about that souls exist not as perfectly in the part as in the whole …”[[47]](#endnote-47) Moreover, that an animal soul “depends on matter in its material being”[[48]](#endnote-48) implies that it is divisible through the division of bodies:

[A]ll souls that are generated by a corporeal agent and that have such a dependence on matter that they perish together with it and are measured through its quantity, are divisible through the division of quantity: for whatever is material with respect to its origin is disposed and affected according to the affections of the receiving body.[[49]](#endnote-49)

The conception of animal souls as extended and divisible beings is fully in line with Gallego’s suggestion that the formative principle internal to the fetus “follows” the temperament of primary qualities. Likewise, it ascribes to animal souls an ontological status that is compatible with the idea that they are “educed” from the potencies of matter. With this characterization of animal souls in hand, we now can look into the characterization of the required external agent and the physiological processes that Gallego regards as responsible for their formation.

4. Incomplete Entities and the Formative Power of the Uterus

Again, Gallego takes up a central insight from Suarez, who ascribes to material accidents an active role in the production of substantial forms but does not believe that material accidents alone could bring forth substantial forms. As Suarez puts it:

And even if there is a natural sequence between this disposition and the form, it is necessary that this sequence happens due to some other efficient cause. For this sequence is not the emanation of the form from the disposition … but it is only the necessary and immediate succession following such a disposition, a succession that necessarily must be founded in the efficacy of another cause, which produces one immediately after the other.[[50]](#endnote-50)

Gallego accepts that for the generation of substantial forms in addition to the disposition of matter, there has to be the agency of an active principle external to the entity to be generated. In distinguishing between the active power capable of educing animal souls from matter and the form of the fetus, he closely follows Suarez’s insight that “[a] form … that is educed from the potency of matter is not properly the formal cause of the action through which it is educed … because it is its end …”[[51]](#endnote-51) But as Gallego notes, Suarez is not forthcoming in telling what the external cause of substantial forms in the case of animal generation is. At this juncture, Gallego takes up the Galenic conjecture that the uterus possesses a formative faculty that contributes to the formation of the fetus.

By the early seventeenth century, this conjecture was far from uncontested. For example, Feyens flatly denies that the generative power of the uterus can concur to generation. One of Feyens’s arguments concerns the notion of formative potency: “Formation is a vital action, that is, an act of life; but acts of life take place by means of an internal principle, not an external one; hence, not by means of the uterus, which is external to the seed …”[[52]](#endnote-52) Another argument has to do with the observation that the formation of the fetus does not start with the outer parts of the fetus:

The seed begins to be formed with respect to all of its parts equally, internal parts as quickly as external parts. Hence, the power that forms is within it. For, if it was not and came from the outside, the external parts would be formed more quickly than the internal parts; and those more quickly that are closer to the place where the power resides than those that are farther away from it.[[53]](#endnote-53)

In response to these objections, Gallego accepts that the fetus possesses an internal formative power but denies that this internal formative power of the fetus develops out of an internal formative power of the seeds. In his view, the formative power of the fetus is brought forth through the agency of the uterus together with a suitable disposition of seminal matter. The upshot of this theory is that the vegetative soul of the fetus is not an entity formed by the uterus and then implanted into the seminal matter but rather an entity that depends both on the agency of uterus and the material disposition of the seminal matter:

[T]he whole being of material souls arises from the progenitor effectively and from matter subjectively; and this is why they are said to be educed from the potency of matter. Which means nothing other than that these souls do not come into being separately from matter, and that a whole by itself comes into being through the union of form and matter; for as the soul of a dog, for example, has a natural inclination towards matter disposed for it: so does the matter disposed by the dog have a natural inclination towards the dog-form. Such a soul, however, is said to be educed from the potency of matter because it is brought into actuality through transmutation brought forth by the agent. [[54]](#endnote-54)

Still, a crucial question remains: What are the physiological processes by means of which the uterus educes a living form from the potency of seminal matter? Gallego characterizes what happens in the uterus as mere “addition or subtraction of matter.”[[55]](#endnote-55) Moreover, as far as the production of the ultimate disposition of matter for the reception of form goes, Gallego characterizes the activity of the uterus in terms of qualitative change:

[N]ot only nature but also art that imitates nature, as often as it wants to inform some piece of matter, always starts with introducing the necessary dispositions. For as often as fire tries to introduce its form into a piece of wood, we experience that it communicates first its qualities to this piece of wood, and finally introduces its form …[[56]](#endnote-56)

In this context, he mentions approvingly a passage from an Arabic Galenist, Hali Abbas (‘Ali ben ‘Abbas, d. c. 994), according to whom the formative power of the uterus should be characterized as the “force of changing and dividing the seed into the various members of the fetus with different temperaments and figures.”[[57]](#endnote-57) Gallego also follows Hali in ascribing an attractive power not only to animated seminal matter but also to bodily organs, including the uterus.[[58]](#endnote-58) But while Hali invokes the attractive power of the uterus only to explain where conception takes place, Gallego extends this idea to explain how the uterus forms the fetus: “[I]n the body there is no organ that by its similarity and natural inclination has the power of attracting some useful substance only for the sake of attraction but rather for the sake of fruition; and because fruitions are varied, and in the natural living bodies they never happen without a change of the attracted thing through a power impressed on them by the attracting thing.”[[59]](#endnote-59) The process that takes place in the uterus thus should be seen in analogy with what happens in other organs. Animal generation is understood here as a kind of metabolism, and this applies especially to the generation of animal souls:

The ultimate form follows naturally from the ultimate disposition out of the necessity of one and the same action. For the form does not follow from the dispositions themselves because these would be operative in the introduction of form, but rather because the power of what gives the ultimate disposition cannot give to this piece of matter, in addition the ultimate disposition, anything other than substantial form itself. [[60]](#endnote-60)

This passage suggests that the action of the uterus that educes the vegetative soul is continuous with the action of the uterus that leads to the ultimate disposition of seminal matter. It is just one more step in the addition and subtraction of material parts—the step that brings forth the temperament upon which the vegetative soul follows. In this is what Gallego has in mind, the production of the ultimate disposition of seminal matter and the “eduction” of the vegetative soul are processes of one and the same kind.

Does Gallego connect this general theoretical framework with any determinate view as to the determination of sex and the acquisition of individual traits? He does, and he does so by departing from a view widely held in his time: the view that the seed is a homogeneous substance, i.e. a substance lacking any structural differences between its single parts. Gallego is aware that if seeds are to play a significant role as merely material causes of animal generation, they must contain parts of varying structure, even if their differences are not perceptible. The agency of the uterus, in his view, depends on the differences between the parts of seminal matter:

In the [male] seed there can be diverse parts such that it together with the female seed and the menstrual blood collected together in the uterus can produce body parts of such diverse nature as well as several fetuses of the same or different sex. And if the matter is perfectly concocted and at the same time spirituous and copious, nature without doubt decides because of the amount and perfection of matter to form several male fetuses in all parts of the uterus; but if matter is copious and endowed with contrary quality, it starts from the beginning to form many female fetuses. However, if matter is copious and intermediary with respect to quality, nature knows in the first instance to separate the parts of matter, which are suitable for a male fetus, and to collect all of it in one place, and those that are suitable for a female fetus in another, and afterward to begin with the formation of both bodies.[[61]](#endnote-61)

Of course, this passage is not free from the biological chauvinism that Gallego shares with many of his predecessors and contemporaries when he tags the differences between male and female seeds in terms of degrees of perfection. However, he regards his account as fully in line with the explanation of the determination of sex proposed by Galen, and there we encounter a reduction of talk of degrees of perfection to a conception of degrees of structural differences that is more value neutral: As Gallego notes, according to Galen “a seed that is less perfect in motion becomes a female, a seed more perfect a male. Yet, he reduces the more or less perfect to a greater or smaller heat, and says that all natural actions can be reduced to this physical principle.”[[62]](#endnote-62) Speaking of greater or smaller heat—qualities that are internal to the seeds—suggests that what Galen has in mind here are motions internal to the seeds. Arguably, Galen here applies Aristotle’s conjectures concerning the role of internal motions of seeds in inheritance from *De generatione animalium* IV, 3. But while Aristotle explicitly ascribes to internal motions an information-bearing character only in the context of his theory of the processes in sensory organs,[[63]](#endnote-63) Gallego characterizes the role of material structures internal to the seeds as information-bearing in a quite specific sense:

From all of the mentioned philosophical foundations it can be derived that the female acts in a mediate way through the uterus, as a univocal cause according to the disposition of matter, not only with respect to accidental similarity but also with respect to similarity of sex, insofar as it is moved towards the generation of several fetuses or a single fetus, guided only by the indication given by the quantity of matter … [[64]](#endnote-64)

Strikingly, material causes here are characterized with the help of a notion that belongs to the theory of signs, and especially to medical semiotics: the notion of indication. As Gallego characterizes them in another medical text, indications are bodily dispositions that fulfill two further criteria: (1) they are immediate causes of imminent diseases, and (2) they are the basis upon which the physician takes precautions such as administering medicaments.[[65]](#endnote-65) This characterization is fully consistent with the Galenic notion of indication: indications are derived from knowledge of the nature of diseases and their causes, and they allow the physician to use medicaments whose qualities are contrary to the qualities of the causes.[[66]](#endnote-66) Of course, there are dissimilarities between medical indications and indications in the case of animal generation. Of course, in the case of indication in the context of animal generation there is no agent that has intellect and cognition. Also, the signs that indicate something are not causally connected to anything that deviates from its proper nature. Accordingly, the agent in question does not fulfill the task of correcting anything. Nevertheless, the analogy between material structures internal to the seed and medical indications is illuminating because material structure in the seed can be understood in analogy to natural signs that signify according to the causal relations in which they stand: Medical indications are natural signs because they are causally related to an imminent disease. Analogously, material structures in seed are natural signs because they are causally related to the traits and sexual characteristics of the parents. And as in the case of the physician interpreting medical indications, the uterus fulfills the role of an external agent that is guided by the information carried by a natural sign. Thus, only together with the agency of the uterus are the material structures internal to seeds capable of bringing forth animal souls. But this is exactly what Gallego’s view of both animal souls and animal seeds as incomplete entities would have us expect.

5. Conclusion

Now it should be clear that Gallego had some quite innovative ideas about how to fill in the explanatory gaps left open by theories of animal seeds as merely material causes of biological reproduction, as suggested by Scotus and Feyens. Gallego has no qualms about the idea of divine concurrence in animal generation and other natural processes, as long as divine agency remains on the level of secondary causes. But he rejects the idea that God could be regarded as the primary cause of animal souls and offers an explanation of the origin of animal souls that invokes only natural primary causes. In his view, the theory of incomplete entities is what can explain how animal souls can be educed from the potency of matter and, as we have seen, thinking of seminal matter and animal souls as incomplete entities can be explicated in terms of an intricate web of dependence relations:

* The dependence of determinate extension on the agency of form: even if prime matter is capable of bringing forth extension, it is incapable of individuating particular boundaries of extension.
* The dependence of the agency of form on extension: the union of form and matter presupposes extension (of the suitably structured kind) because the goal of this union consists in the specific activities of the form.
* The dependence of both the ultimate preparation of matter and the final eduction of form from matter on an external agent.
* The dependence of the agency of an external agent on the structure of seminal matter.

Gallego identifies the external agent relevant for the generation of animal souls as the uterus and understands the process that leads to the generation of material forms in analogy with metabolism taking place in other bodily organs. In this way, as for Scotus and Feyens, animal seeds still function merely as material causes of reproduction. At the same time, Gallego goes beyond Scotus and Feyens by ascribing to such material causes enough internal structure to guide the development of the fetus in such a way that they account both for trait acquisition and the determination of sex.

1. See Pereira, Gómez. 1554. *Antoniana Margarita*. Medina del Campo [no publisher]. On Descartes’s relation to Pereira, see Sanhueza, Gabriel 1997. *La pensée biologique de Descartes dans ses rapports avec la philosophie scholastique: Le cas Gómez Pereira*. Paris: L’Harmattan. [↑](#endnote-ref-1)
2. Gallego’s biographical data are not recorded by any of the specialized libraries holding his writings. So, one has to go by the dates of his two major publications: Gallego de la Serna, Juan. 1634. *Opera physica, medica, ethica, quinque tractatibus comprehensa*. Lyon: Iacobus & Petrus Frost; Gallego de la Serna, Juan. 1640. *De naturali animarum origine*, Brussels: Franciscus Vivienus. The latter work was edited posthumously; Gallego’s preface is dated May 1638. Both works are available online at googlebooks.com. [↑](#endnote-ref-2)
3. This view was accepted, among others, by Girolamo Cardano, Julius Caesar Scaliger, Jacopo Zabarella, and Daniel Sennert; for detailed expositions, see Feyens, Thomas. 1620. *De formatrice foetus*, Antwerp: Gulielmus a Tongris (available online at googlebooks.com), 44-54; Gallego 1634, 64-68. [↑](#endnote-ref-3)
4. This view was accepted, among others, by Aquinas, the Coimbra Commentators, Jean Fernel, Laurent Joubert, and Francesco Piccolomini; for detailed expositions, see Feyens 1620, 88-91; Gallego 1634, 22; 33. [↑](#endnote-ref-4)
5. Gallego 1634, 133. [↑](#endnote-ref-5)
6. Ibid., 95. [↑](#endnote-ref-6)
7. Duns Scotus, Ioannes. 1993. *Opera omnia*, vol. 19, Civitas Vaticana: Typis Vaticanis, 159. [↑](#endnote-ref-7)
8. Ibid. [↑](#endnote-ref-8)
9. Ibid., 160-161. [↑](#endnote-ref-9)
10. Ibid., 163. [↑](#endnote-ref-10)
11. On Feyens’s work in these areas, see Rather, L. J. 1967. “Thomas Fienus’ (1567-1631) Dialectical Investigation of the Imagination as Cause and Cure of Bodily Disease.” *Bulletin of the History of Medicine* 41: 349-367; Papy, Jan. 1999. “The Attitude towards Aristotelian Biological Thought in the Louvain Medical Treatises during the Sixteenth and Early Seventeenth Century: The Case of Embryology.” In *Aristotle’s Animals in the Middle Ages and Renaissance*, edited by CarlosSteel, Guy Guldentops, and Pieter Beullens, 317-337. Leuven: Leuven University Press. [↑](#endnote-ref-11)
12. Feyens 1620, 92; see Gallego 1634, 102. [↑](#endnote-ref-12)
13. Feyens 1620, 61-62. [↑](#endnote-ref-13)
14. Gallego 1634, 70. [↑](#endnote-ref-14)
15. Ibid., 71. [↑](#endnote-ref-15)
16. Scotus 1993, 163-164; see Gallego 1634, 125. [↑](#endnote-ref-16)
17. Feyens 1620, 135. [↑](#endnote-ref-17)
18. Ibid., 141. [↑](#endnote-ref-18)
19. Ibid., 142. [↑](#endnote-ref-19)
20. Ibid., 143. [↑](#endnote-ref-20)
21. Gallego 1634, 98. [↑](#endnote-ref-21)
22. Suarez, Francisco. 1597. *Disputationes metaphysicae*. Vol. 1. Salamanca: Ioannes & Andreas Renaut, 18.2.20 (cited according to disputation, section, and subsection; available online at googlebooks.com). [↑](#endnote-ref-22)
23. Suarez 1597, 15.6.10. [↑](#endnote-ref-23)
24. Ibid. [↑](#endnote-ref-24)
25. Ibid., 15.6.5. [↑](#endnote-ref-25)
26. Ibid. [↑](#endnote-ref-26)
27. Kronen, John D., Sandra Menssen, and Thomas D. Sullivan. 2000. “The Problem of the Continuant: Aquinas and Suarez on Prime Matter and Substantial Generation,” *The Review of Metaphysics* 53: 863-885, at p. 873. [↑](#endnote-ref-27)
28. Suarez 1597, 14.3.10; Suarez refers to Averroes’s *Physics Commentary* I, 64. [↑](#endnote-ref-28)
29. Ibid., 14.3.57. [↑](#endnote-ref-29)
30. Ibid. [↑](#endnote-ref-30)
31. Ibid., 14.3.3. [↑](#endnote-ref-31)
32. Ibid., 14.3.12. [↑](#endnote-ref-32)
33. Ibid., 14.3.19. [↑](#endnote-ref-33)
34. Ibid., 14.3.42. [↑](#endnote-ref-34)
35. Ibid., 14.3.42. [↑](#endnote-ref-35)
36. Ibid., 15.6.7. [↑](#endnote-ref-36)
37. Gallego 1640, 42-43. [↑](#endnote-ref-37)
38. Gallego 1634, 142. [↑](#endnote-ref-38)
39. Ibid. [↑](#endnote-ref-39)
40. Ibid. [↑](#endnote-ref-40)
41. Ibid., 119; Gallego’s reference is to book I of Galen’s *De naturalibus facultatibus*. [↑](#endnote-ref-41)
42. Gallego 1634, 174. [↑](#endnote-ref-42)
43. Ibid., 142. [↑](#endnote-ref-43)
44. Gallego 1640, 32. [↑](#endnote-ref-44)
45. Gallego 1634, 23; Gallego’s references are to Galen, *De elementis* I, 9 and *De methodo medendi* I, 6. [↑](#endnote-ref-45)
46. Gallego 1634, 143. [↑](#endnote-ref-46)
47. Gallego 1640, 32. [↑](#endnote-ref-47)
48. Ibid., 10. [↑](#endnote-ref-48)
49. Ibid., 35. [↑](#endnote-ref-49)
50. Suarez 1597, 14.3.30. [↑](#endnote-ref-50)
51. Ibid., 15.6.10. [↑](#endnote-ref-51)
52. Feyens 1620, 23. [↑](#endnote-ref-52)
53. Ibid. [↑](#endnote-ref-53)
54. Gallego 1640, 7. [↑](#endnote-ref-54)
55. Gallego 1640, 8. [↑](#endnote-ref-55)
56. Gallego 1634, 139. [↑](#endnote-ref-56)
57. Ibid., 148. The reference is to Hali. 1492. *Regalis dispositio*. Venice: Johannes de Nigro, fol. 25v (available online at googlebooks.com) [↑](#endnote-ref-57)
58. Gallego 1634, 148; see Hali 1492, fol. 25r. [↑](#endnote-ref-58)
59. Gallego 1634, 148. [↑](#endnote-ref-59)
60. Ibid., 158. [↑](#endnote-ref-60)
61. Ibid. [↑](#endnote-ref-61)
62. Ibid. [↑](#endnote-ref-62)
63. See *De gen. an.* V, 1. Devin Henry has argued that this could be sufficient grounds for ascribing an information-bearing character to the internal motions in seeds, as well; see Henry, Devin. 2006. “Aristotle on the Mechanism of Inheritance,” *Journal of the History of Biology* 39: 425-455. [↑](#endnote-ref-63)
64. Gallego 1634, 158. [↑](#endnote-ref-64)
65. Ibid., 303. The most detailed study of medical semiotics in Gallego’s time is Maclean, Ian. 2002. *Logic, Signs, and Nature in the Renaissance: The Case of Learned Medicine*. Cambridge: Cambridge University Press. [↑](#endnote-ref-65)
66. Gallego 1634, 307. [↑](#endnote-ref-66)