Daniel Sennert and the Late Aristotelian Controversy over the Natural Origin of

Animal Souls

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**Introduction**

While both the Aristotelian and the Galenic traditions took it to be the hallmark of animals that they are beings endowed with sensi­tive souls, in both traditions there were ambiguities concerning the question of whether animal seeds are animate or inanimate.[[1]](#endnote-1) These ambiguities go back to the writings of Aristotle and Galen. Aristo­tle maintains that an animal seed possesses a soul only *potentially* in the sense that a vegetative soul is actualized in the fetus as soon as the process of nutrition and growth begins,[[2]](#endnote-2) while also ascribing to the animal seed an enigmatic entity called “vital heat” or “pneuma” that many of his early modern readers took to indicate that, in Aristotle’s view, the seed is animated from the beginning of its existence. Even more confusingly, in *On the Natural Faculties* Galen suggests that the primary and elementary alterative faculties involved in animal generation are nothing other than moisture, dryness, coldness and warmth such that all other qualities naturally derive from them,[[3]](#endnote-3) while in *On Semen* Galen ascribes to animal seeds not only a material principle but also a creative principle that develops into the vegetative soul active in the fetus.[[4]](#endnote-4) These pas­sages in Aristotle and Galen presented their early modern readers with inextricable textual puzzles that rendered any appeal to argu­ments from authority problematic.

No wonder, then, that the early moderns were looking for more clear-cut solutions. On the one hand, there was the option to regard animal seeds as actually endowed with souls—a view prominently defended by the Agen-based natural philosopher Jul­ius Caesar Scaliger (1484–1558) and the Wittenberg-based physi­cian Daniel Sennert (1572–1637). On the other hand, there was the option to regard animal seeds as purely material beings. This view was prominently defended by Gómez Pereira (1500–c. 1558), who is sometimes seen as a precursor of Descartes’ conception of natu­ral automata.[[5]](#endnote-5) What may come as a surprise, however, is that the conception of animal seeds as purely material beings is also com­bined with rich resources of late Aristotelian natural philosophy in the work of other Spanish thinkers widely read in their time such as Antonio Ponce de Santacruz (1561–1632) and Juan Gallego de la Serna, royal physicians to the Spanish kings Philip III and Philip IV.[[6]](#endnote-6) Obviously, theories of seeds endowed with souls or vital princi­ples offer richer explanatory resources than theories of in­animate seeds. The former theories offer straightforward explana­tions of the origin of animal souls: animal souls develop out of the souls or vital principles of seeds. However, this only pushes the question of the origin of animal souls one step further back because the origin of the souls or vital principles of seeds still has to be explained. Scaliger conjectured that all substantial forms, including those that function at some point of their history as vital principles of animals, have been created at the beginning of the world and only can change the relations in which they stand to other substan­tial forms. In Scaliger’s view, when an animal is generated, a sub­stantial form that previously existed as a subordinate form in a composite develops into the dominant form of an organic being.[[7]](#endnote-7) By contrast, Sennert held that there is genuine generation of animal souls. As he conjectures, substantial forms of living beings have been created at the beginning of the world but possess—in analogy to a capacity that scholastic natural philosophy ascribed to sensible species—a capacity of multiplying themselves and thereby induc­ing new forms into matter.[[8]](#endnote-8)

The plausibility of such an account of the origin of animal souls, of course, depends on whether the alternative theories of animal seeds as purely material beings provide sufficient explana­tory resources. In fact, Sennert offers some perceptive criticisms of Gallego’s theory of animal generation, which prompted Gallego to write a book-length response. In this article, I will focus on this controversy. In his theory of animal generation, Gallego uses two notions that played a significant role in late Aristotelian natural philosophy: the notion of the eduction of forms from the potency of matter, and the theory of matter and form as incomplete entities. Gallego’s reply to Sennert will help to clarify how the notion of incomplete entities can be of help for defending the view that ani­mal souls are educed from the potencies of matter. To get a clear grasp of what is distinctive about Gallego’s approach, it will be useful to outline some late Aristotelian approaches to the problem of the origin of forms. Subsequently, Gallego’s usage of the notion of incomplete entities will have to be contrasted with the usage found in the work of Francisco Suárez (1548–1617). This sets the stage for a discussion of Sennert’s objections against Gallego, which center on the causal role that Gallego as­cribes to the uterus in the process of the eduction of animal souls.

**Sennert and Late Aristotelian Notions of the Eduction of Forms**

The notion of the eduction of forms from the potencies of matter is centered on the idea that the potentiality of forms is present in suitably organized matter and can in some way be actualized. Among the late Aristotelian thinkers whom Sennert mentions as authorities in this field, Antonio Ruvio (1548–1615) clarifies this notion by distinguishing it from two views that he rejects: (1) vari­ous versions of the theory of the pre-existence of forms in matter and (2) theories of the eduction of forms from material dispositions through the agency of a non-natural agent. The first view that Ruvio rejects has it that “before a natural thing is generated its form actually pre-existed in matter”.[[9]](#endnote-9) As Ruvio makes clear, there are several versions of this view. One version has it that “the forms of all things pre-exist in some indivisible atoms, out of which all things arise.”[[10]](#endnote-10) Another version has it that forms are present in matter in a “confused” and hidden way such that they still have to be made “manifest”.[[11]](#endnote-11) Yet another version has it that forms are present in matter in an imperfect or “inchoate” way such that in the process of generation they still have to be perfected and developed. And finally, there is a version that has it that forms are present in matter only partially, so that in the process of generation they still have to be completed.[[12]](#endnote-12) The second view rejected by Ruvio has it that

forms do not pre-exist in any way in matter, either actually, or potentially, but only in the power and potency of some higher agent that produces them, and that immediately unites them with matter. Thus, when fire is generated out of fire, its form did not pre-exist in matter, neither actually nor potentially; rather, the matter itself receives a disposition from another fire, through the heat and dryness that is produced in it: and in matter prepared in this way by fire, the form of fire is pro­duced by some intelligence …[[13]](#endnote-13)

As Ruvio explicates, according to this second view the “higher agent” is understood as an intelligence or as God and, hence, this view is closely connected with the Platonic view that forms are induced into matter as a realization of ideas that exist in the realm of abstract objects.[[14]](#endnote-14)

Ruvio’s objection against the first view is the following:

[F]orm was not actually in matter, because in that case it would have been in matter before generation; hence, it was united to it. The inference is proved because there is an in­compatibility between being actually in matter, and being sep­arated from it; but out of actually existing and uniting matter and form a composite results; hence, there already existed a composite, and therefore in generation nothing new comes into being—which is false.[[15]](#endnote-15)

Thus, his objection is a conceptual objection: assuming the exist­ence of pre-existing, but less perfect forms would lead to the view that what we take to be generation is nothing but the development of previously existing composite beings. Such a view has the clear implication that, strictly speaking, no generation ever takes place—a revision of our ordinary concepts that Ruvio is not ready to ac­cept.

Ruvio’s objection against the second opinion runs as follows:

[I]f form does not pre-exist either in actuality or in potentiality … but only in the active potency of an agent, it evidently fol­lows that all substantial material forms are truly and properly created … The inference is proved as follows: that forms are in the active potency of some higher intelligence before gener­ation does not do away with their creation nor even with the fact that they arise in this way in the already disposed matter through the action of a proximate agent …[[16]](#endnote-16)

Again, this is an argument that can be understood as a conceptual argument. Of course, the possibility of such external influence—be it the influence of higher intelligences, the influence of celestial bodies, or the influence of God—was widely discussed in medieval and early modern natural philosophy.[[17]](#endnote-17) Ruvio’s objection seems to be that if the possibility of such influences were accepted, one would have to describe it as creation rather than as generation. Again, it is the absurdity of giving up the usual conceptualization of biological reproduction as generation that speaks against the theory criticized.

While Ruvio’s criticism of alternative views concerning the origin of forms is illuminating because it makes clear what the eduction of forms from the potency of matter is not, and also what motivates the adoption of the notion of eduction, his positive char­acterization of the eduction relation remains sketchy, boiling down to the view that a form that is educed from the potency of matter depends in being and becoming on matter.[[18]](#endnote-18) However, a more detailed list of properties of forms that are educed from the potency of matter is found in another scholastic mentioned by Sennert, Benito Pereira (1535–1610):

1. All such forms are generated by material agents, through material actions and material dispositions; that is those that in­here and are fixed in matter itself. 2. In coming into being, these forms depend on matter, i.e., they cannot be generated except within matter and entirely conjoined with it, for they are not produced by themselves, and do not arise from the out­side and then become joined with matter. 3. They depend on matter in being; for outside the matter in which they were ini­tially produced, they cannot subsist by themselves even for a moment of time nor can they exist in another matter; rather, to separate them from their own matter and cease to exist is for them one and the same thing. 4. They depend on matter for their operations, from whence it comes about that the opera­tions of such forms do not exist subjectively in the form but exist in the whole composite. 5. They depend on matter with respect to their quiddity, which is why they cannot be defined or be perfectly understood without it.[[19]](#endnote-19)

Moreover, as Pereira explains, “the term ‘quiddity’ designates all that belongs to the integrity of the substance and nature of a compo­site.”[[20]](#endnote-20) Thus, there is some quite developed sense of the characteristics of forms educed from the potency of matter. Still, the nature of the eduction relation itself remains elusive since Pe­reira does not explicate the nature of the material dispositions and actions that are thought to be involved in the eduction of such forms.

In his *Hypomnemata Physica* (1636)—a series of essay on natural philosophy—Sennert develops his own conception of ani­mate atoms and defends it against contemporary eduction theo­ries.[[21]](#endnote-21) Among a series of objections that he raises, he points out a crucial weakness of the version of eduction theory defended by Pereira and Ruvio:

We readily concede that those inseparable forms cannot come into being … without matter and outside of matter and that they exist and operate in and with matter: however from this it does not follow that forms are educed from the potency of matter and that with respect to essence they have a dependence on matter, which behaves in a purely passive way.[[22]](#endnote-22)

Thus, Sennert’s objection is that the second condition specified by Ruvio and properties (2), (3) and (4) specified by Pereira do not necessarily imply that forms are educed from the potency of mat­ter. Rather, the dependence relations identified by Ruvio and Pe­reira may also apply to immaterial forms that are neither produced by material agents and processes nor depend on matter with respect to their essence.

What is more, Sennert develops an argument that is meant to show that the eduction relation envisaged by Ruvio and Pereira cannot occur in nature. To reach this conclusion, he offers two possible readings of the thesis that during the process of eduction of a form something that was there potentially before becomes actualized: (1) it could mean that the form arises out of material qualities, that is, out of the temperament of a mixed body; or (2) it could mean that the form of a mixed body or the forms of elements change into the form of a living being. Both option seem absurd to Sennert,

for neither can an accident change into a substance, nor can a form change into another form, nor can the forms of living beings be composed of elements. And no matter how this dis­position toward form is explicated, because it takes place suc­cessively part by part, the ultimate degree must be of the same kind and perfection as the preceding degrees, it cannot consti­tute the actuality of a thing and give the essence of a sub­stance.[[23]](#endnote-23)

Thus, Sennert’s argument against reading (1) is that a merely grad­ual change of accidents remains in the same ontological category without reaching the perfection characteristic of substances. His argument against reading (2) seems to be that the change of one form into anther would involve gradual change—change part by part. This, however, is exactly what eduction theorists seem to accept, and the passage quoted does not indicate what is wrong about this assumption. However, earlier in the *Hypomnemata*,Sennert argues that no substantial form is capable of undergoing changes that allow for differences of degrees because a substantial form is indivisible. As he argues, this is so because differences of more and less would presuppose that contrary entities could be added to each other to bring about a change in form.[[24]](#endnote-24) Apparently, when he speaks of the idea of adding contrary entities, Sennert refers to one of the prominent late Aristotelian theories of the change of intensive magnitudes: the theory built upon the view that such change takes place through addition and subtraction of quali­tative parts.[[25]](#endnote-25) In late Aristotelian natural philosophy, the question of whether such a conception of qualitative change could also ac­count for change on the level of forms—what was called the “in­tension” and “remission” of form—was fiercely debated.[[26]](#endnote-26) Sennert takes side with the critics of an extension of the addition-and-sub­traction account of qualitative change to the level of forms. This is so because he maintains that a substantial form is not composed of parts but is non-quantitative and indivisible entity.[[27]](#endnote-27) This is why Sennert argues that the supposition that forms could undergo change through the addition or subtraction of parts would be con­trary to the supposition of indivisibility of forms. Thus his argu­ment is that, due their indivisibility, forms cannot be arise from other forms because forms cannot undergo the kind of gradual transition that would be required for such a process.

**Suárez and Gallego on Eduction and Incomplete Entities**

Thus far, Sennert has identified some tensions between late Aris­totelian accounts of the eduction of forms and the widely shared assumption that forms behave like numbers. Yet, Sennert does not consider all theoretical options that are available in late Aristote­lian eduction theories. And, as it turns out, one of the options not considered by Sennert is crucial for a grasp of Gallego’s views concerning the natural origin of animal souls: the analysis of eduction in the context of Suárez’s theory of incomplete entities. Arguably, some of the shortcomings of Sennert’s criticism of Gallego’s views on animal generation are due to this oversight.

Suárez goes a step beyond Ruvio and Pereira by analyzing the relevant kind of action under the heading of material causation:

[T]he causality of matter, insofar as it is a form in the state of becoming, be it the matter of the form or of the composite, is nothing other than generation itself, insofar as it is essentially dependent on matter, for by means of generation matter con­curs to the eduction of form or to the composition of the com­posite; but the causality of the cause is nothing other than its concurrence. Likewise, because to cause a thing in the state of becoming is nothing other than that the becoming of the thing comes about through such a cause; hence, the same causality causes the thing in the state of becoming that also causes the becoming of the thing.[[28]](#endnote-28)

Moreover, Suárez offers the following analogy between eduction and action:

As action arises from the agent, not by means of some other action but by itself, and as it possesses the nature of action be­cause it is itself an emanation from the active cause and thereby is itself the causality of the agent …: so is eduction, or passive generation, insofar as it essentially depends on the subject and is by itself necessarily conjoined with it, materially caused, not through some other causation, but by itself.[[29]](#endnote-29)

The point of Suárez’s analogy seems to be that both eduction and action work without causal intermediaries, but this alone, of course, does not tell us anything about how forms and actions are immediately caused by their substrates. Luckily, however, some aspects of his theory of matter and form as incomplete entities can fill this lacuna. And it is for this reason that Gallego takes up Suárez’s considerations concerning the eduction of animal souls from the potencies of matter.

Gallego takes animal seeds to be merely material causes, which have received some material dispositions that, in turn, play a role in the development of the function of the parts of the fetus and the generation of the animal soul.[[30]](#endnote-30) Moreover, he is aware that Suárez’s theory of matter and form as incomplete entities is what can explicate the workings of such material causes. One of the foundations of Suárez’s theory of incomplete entities can be found in his view that material dispositions co-operate actively in the production of substantial forms:

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 …[[31]](#endnote-31)

Suárez 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.”[[32]](#endnote-32) 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 Suárez’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.[[33]](#endnote-33)

Gallego agrees with Suárez’s general insight into the mutual de­pendence between quantity and form. Still, he 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.”[[34]](#endnote-34) And, as he emphasizes, in the case of animal souls this ultimate end consists in organic actions.[[35]](#endnote-35) Consequently, for Gallego the production of substantial form requires two factors: (1) a specifically organic disposition of matter, and (2) an external agent that produces a form-matter-composite.[[36]](#endnote-36)

Gallego thereby clearly distinguishes between the form of the fetus and the active power capable of educing animal souls from matter. In one respect, he thereby follows Suárez’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 …”[[37]](#endnote-37) But as Gallego notes, Suárez 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. 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.[[38]](#endnote-38)

**The Origin of Animal Souls and the Controversy between Sennert and Gallego**

Obviously, much in this account of animal generation needs further explication, and some of the most illuminating clarifications that Gallego offers are found in his response to Sennert’s criticism. Sennert objects that the eduction of forms, as understood by Gallego, implies that matter would be understood as the only effi­cient cause of generation, which is implausible if one ascribes, as Sennert does, only passive characteristics to matter.[[39]](#endnote-39) In response, Gallego points out the role of the uterus as an active cause external to both the seed and the menstrual blood in bringing about a grad­ual development of a living being out of an inanimate being:

Because this whole work happens through a changing motion by means of which the menstrual blood is substantially changed into flesh, bones and the other parts, it is impossible that a natural agent—since it has limited potency—instantly undergoes a transition from the imperfect to the most perfect; rather, it tends towards the production of the most perfect form step by step, part by part and by means of some intermediary forms.[[40]](#endnote-40)

Gallego does not regard these intermediary forms as souls but rather ascribes to them a causal role in the generation of souls. He is also not committed to the view that these intermediary forms themselves develop into souls. Rather, he holds that once their causal role in the production of souls is fulfilled, the intermediary forms cease to exist.[[41]](#endnote-41) Still, Gallego regards souls as entities educed from the potency of matter: “inasmuch as material souls or whatever other forms acquire being in matter, they are said to be educed from the potency of matter because of the substantial trans­formation of this same matter …”[[42]](#endnote-42)

The dependence of animal souls on matter explains why, in Gallego’s view, it does not make sense to assume that souls can be induced into seminal matter from the outside. This, however, is exactly what Sennert assumes. Sennert defends such an assumption by arguing that the soul can animate a seed even before organic structures develop:

The soul by itself and primarily inheres in parts insofar as they are homogeneous, and not insofar as they are organic. In or­ganic parts it inheres only insofar as they consist of homoge­nous parts. But homogeneous parts, as such, do not have a de­terminate figure; and therefore the soul is in them not insofar as they have a determinate figure or quantity but only insofar as they are homogeneous.[[43]](#endnote-43)

Against Sennert’s view that the soul animates only the homogene­ous parts of the body, Gallego argues 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*, where Aristotle points out that heavenly bodies lack organs of animal motion but have the adequate shape for the mo­tion specific to them.[[44]](#endnote-44) 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.”[[45]](#endnote-45)

Beyond defending the idea that souls could animate seeds that lack organic structures, Sennert mounts a direct attack against Gallego’s view concerning the causal role of the uterus and offers a series of objections against such an argumentative move: (1) If the uterus would form the fetus, the male parent would not communi­cate an active principle of generation but only a passive one.[[46]](#endnote-46) (2) If the uterus would form the fetus, at some point the formative power would have to be transferred to the fetus; “but the power of concocting, changing, forming is immanent and does not wander from one subject into another …”[[47]](#endnote-47) (3) There would be no reason why the fetus sometimes is similar to the father.[[48]](#endnote-48) (4) There would be no reason why not only females but also males are generated.[[49]](#endnote-49) (5) What perfects the work of formation must necessarily touch the fetus. But the uterus does not touch the fetus immediately but in between the uterus and the fetus there are membranes, and those watery excrements surrounded by the membranes.[[50]](#endnote-50)

These objections offer to Gallego the opportunity to clarify his views concerning the causal role of the uterus. To begin with, he makes clear 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 …[[51]](#endnote-51)

Thus, the process of the eduction of the animal soul involves not only efficient causation originating from the uterus but also in­volves material dispositions. What is more, Gallego tries to avoid the implausible view that, in the formation of the fetus, a substan­tial form wanders from one subject (the uterus) to another subject (the seed). Rather, he regards the uterus as an external efficient cause by virtue of whose substantial form the accidents of the seeds could be understood as means for generating a substance. As he suggests, the uterus could thereby be understood as the efficient cause, while the seeds themselves could be understood as the mate­rial causes of generation:

It is evident that the soul that actually informs a body can con­fer conservation to the body that it informs; but it cannot bring about the disposition required for its first introduction: for it is impossible that it could govern some matter or subject that it does not yet inform.[[52]](#endnote-52)

Hence, it is necessary that this first preparation of matter does not arise from a form yet to be produced but from an already informed individual of the same species in which there is the power of pro­ducing something that is similar to it through the substantial trans­formation of unprepared matter.[[53]](#endnote-53)

With regard to the origin of male offspring and the causes of the similarities between parents and offspring, Gallego follows the footsteps of medical two-seed theories.[[54]](#endnote-54) On this basis, Gallego argues that females could not bring forth offspring without a male because one part of the material cause would be missing.[[55]](#endnote-55) He also does not believe that if, contrary to what is the case, females could bring forth offspring without a male, only female fetuses would be generated; rather, the determination of sex in his view depends also on material causes—the mixture of male and female seeds.[[56]](#endnote-56) What is more, Sennert overlooks that Gallego already in his first formu­lation of his theory of animal generation has developed a rather elaborate theory of trait acquisition. Gallego there accepts the ex­planation of the determination of sex proposed by Galen. As he 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.”[[57]](#endnote-57) 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.[[58]](#endnote-58) 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 … [[59]](#endnote-59)

Finally, as to the objection that the uterus does not touch the fetus, Sennert himself suggests that a possible solution would be to posit some occult modes of operation at a distance, in analogy to the modes of operation of the torpedo fish and the magnet that natural philosophers such as Girolamo Fracastoro (ca. 1487–1553) ac­counted for by stipulating entities called “spiritual species”.[[60]](#endnote-60) In response to this suggestion, Gallego agrees that positing an influ­ence in analogy to the power of magnetism could fulfill this pur­pose. But such recourse to occult powers is exactly what he wants to avoid:

I always take care to choose the king’s way of nature and to hold that the soul is by no means absent from the objects that are comprised in the boundaries of its body, and that it oper­ates upon these objects by means of virtual contact: for the liver attracts the chyle found in the digestive organs by means of an attractive virtue … And the same applies to the faculties that serve for the change of external food-stuff. For, although the substance of the stomach touches only the surface of the foodstuff taken in, it nevertheless changes the whole bulk of the foodstuffs.[[61]](#endnote-61)

As examples of such an action of “virtual contact” he regards the attraction of some body fluids by organs such as the liver and the brain. Another example that he mentions is the action of the stom­ach on the foodstuff taken in.[[62]](#endnote-62) In both cases, the action goes be­yond the surfaces that immediately touch—most plausibly, what Gallego has in mind when he talks about virtual contact is a kind of action that takes place by means of a series of immediate contacts and thereby reaches parts in the interior of bodies. Such a reading is confirmed by Gallego’s characterization of the role of the mem­branes surrounding the fetus:

I do not say that these membranes are parts constitutive of the fetus … but that they are made and that they are alive and animated by the uterus, even though only with vegetative life, and that by means of the continuity of actions the entire re­maining work of generation is completed …[[63]](#endnote-63)

Thus, the continuity of action relevant for the agency of the uterus does not require immediate contact between the uterus and the fetus; all that is required is that the uterus directly touches some­thing in between such that the action is transmitted through a series of intermediaries that touch each other immediately.

**Conclusion**

Sennert’s *Hypomnemata* offer some fascinating insights into the late Aristotelian controversy over the natural origin of animal souls. On the one hand, Sennert’s objections against Ruvio and Pereira highlight some of the problems inherent in some late scho­lastic accounts of the eduction of animal souls from the potency of matter. On the other hand, because Sennert overlooks the version of eduction theory developed by Suárez, Sennert’s objections against Gallego have weaknesses of their own, and through their weaknesses the specific strengths of Gallego’s version of eduction theory become more salient than they might otherwise be. Contrary to what Sennert believes, Gallego regards animal seeds as entities with active powers of their own that, together with the active pow­ers of the uterus, give rise to animal souls. Moreover, contrary to what Sennert assumes, Gallego is not committed to the problematic theory of a transfer of potencies from the uterus to the fetus; rather, in Gallego’s view the uterus acts upon the fetus by means of indi­rect touch, i.e., by means of a series of intermediary mechanical interactions. Finally, contrary to Sennert’s reading, for Gallego the seeds of the male and the female are material causes that are en­dowed with information-bearing structures that guide the develop­ment of animal organs and animal souls, thereby providing an explanation for the similarity between parents and offspring as well as an explanation for the determination of sex.

**References**

Arthur, R. T. W. (2003) “The Enigma of Leibniz’s Atomism”, *Oxford Studies in Early Modern Philosophy* 1, pp. 243–302.

— (2006) “Composite Substance and Animal Genera­tion in Sennert and Leibniz”, in *The Problem of Animal Gener­ation in Modern Philosophy*,edited by J. E. H. Smith, Cam­bridge: Cam­bridge University Press.

Blank, A. (2008) “Julius Caesar Scaliger on Corpuscles and the Vacuum”, *Perspectives on Science* 16, pp. 137–159.

— (2010) “Julius Caesar Scaliger on Plant Generation and the Question of Species Constancy”, *Early Science and Medicine* 15, pp. 266–286.

— (2011) “Sennert and Leibniz on Animate Atoms”, in *Machines of Nature and Composite Substances in Leibniz*, edited by J. E. H. Smith & O. Nachtomy, Dordrecht: Springer.

— (2012) “Julius Caesar Scaliger on Plants, Species, and the Or­dained Power of God”, *Science in Context* 25, pp. 503–523.

— (2014) “Material Causes and Incomplete Entities in Gallego de la Serna’s Theory of Animal Generation”, in *The Life Sciences in Early Modern Philosophy*, edited by O. Nachtomy & J. Smith, Oxford: Oxford University Press.

Boylan, M. (1984) “The Galenic and Hippocratic Challenges to Aristotle’s Conception Theory”, *Journal of the History of Biol­ogy* 17, pp. 83–112.

— (1986) “Galen’s Conception Theory”, *Journal of the History of Biology* 19, pp. 47–77.

Clagett, M. (1950) “Richard Swineshead and Late Medieval Phys­ics: I. The Intension and Remission of Qualities”, *Osiris* 9, pp. 131–161.

Dudley Sylla, E. (2001) “Walter Burley’s ‘Physics’ Commentaries and the Mathematics of Alteration”, *Early Science and Medicine* 6, pp. 149–184.

Gallego de la Serna, J. G. (1634) *Opera physica, medica, ethica, quinque tractatibus comprehensa*. Lyon: Iacobus & Petrus Frost.

— (1640) *De naturali animarum origine*, Brussels: Franciscus Vivienus.

Henry, D. (2006) “Aristotle on the Mechanism of Inheritance”, *Journal of the History of Biology* 39, pp. 425–455.

Hirai, H. (2007) “Atomes vivants, origine de l’âme et génération spontanée chez Daniel Sennert”, *Bruniana & Campanelliana* 13, pp. 477–495.

Maier, A. [1939] (1951) “Das Problem der intensiven Größe”, in *Zwei Grundprobleme der scholastischen Naturphilosophie*, 2nd edition, Rome: Edizioni di storia e letteratura.

Michael, E. (1997) “Daniel Sennert on Matter and Form: At the Juncture of the Old and the New”, *Early Science and Medicine* 2, pp. 272–300.

— (2001) “Sennert’s Sea Change: Atoms and Causes”, in *Late Medieval and Early Modern Corpuscular Matter Theories*, edited by C. Lüthy, J. E. Murdoch & W. R. Newman,Leiden, Boston, MA & Cologne: Brill.

Pereira, G. (1554) *Antoniana Margarita* (Medina del Campo [no publisher].

Pererius, B. (1579) *De communibus omnium rerum naturalibus principiis & affectionibus*, Paris: Michael Sonnius.

Pluta, O. (2007) “How Matter Becomes Mind: Late-Medieval Theories of Emergence”, in *Forming the Mind. Essays on the In­ternal Senses and the Mind/Body Problem from Avicenna to the Medieval Enlightenment*, edited by H. Lagerlund, Dordrecht: Springer, pp. 149–167.

Ruvio, A. (1542) *Aristotelis Stagiritae Libri Metaphy[sicorum] XII cum singulorum Epitomatis hactenus non impressis*, Lyon: Jacobus Giunta, fol. 161v–162r.

— (1620) *Commentarii in octo libros Aristotelis de Physico auditu*, Lyon: Antoine Pillehotte.

Sanhueza, G. (1997) *La pensée biologique de Descartes dans ses rapports avec la philosophie scholastique: Le cas Gómez Pereira*. Paris: L’Harmattan.

Sennert, D. (1636) *Hypomnemata physica*, Frankfurt: Schleich.

Shapiro, H. (1959) “Walter Burley and the Intension and Remis­sion of Forms”, *Speculum* 34, pp. 413–427.

Solère, J.-L. (2001) “The Question of Intensive Magnitudes Ac­cording to Some Jesuits in the Sixteenth and Seventeenth Centu­ries”, *The Monist* 84, pp. 582–616.

Solmsen, F. (1957) “The Vital Heat, the Inborn Pneuma and the Aether”, *Journal of Hellenic Studies* 77, pp. 119–123.

Stolberg, M. (2003) “Particles of the Soul. The Medical and Lu­theran Context of Daniel Sennert’s Atomism”, *Medicina nei secoli* 15, pp. 177–203.

Suárez, F. (1866) *Disputationes metaphysicae*, in F. Suárez, *Opera omnia*, edited by C. Berton. Vols. 25–26. Paris: Vives.

Takahashi, A. (2008) “Nature, Formative Power and Intellect in the Natural Philosophy of Albert the Great”, *Early Science and Medicine* 13, pp. 451–481.

1. For overviews over ancient conception theories, see Boylan (1984), 83–112; Boylan (1986), 47–77. [↑](#endnote-ref-1)
2. Aristotle, *De gen. an.* II, 1, 735a3–21. On this theory, see Solmsen (1957), 119–123. [↑](#endnote-ref-2)
3. Galen, *De facultatibus naturalibus* I, 6. [↑](#endnote-ref-3)
4. Galen, *De semine* I, 9, 14–18. [↑](#endnote-ref-4)
5. See Pereira (1554). On Descartes’s relation to Pereira, see Sanhueza (1997). [↑](#endnote-ref-5)
6. 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 (1634); Gallego de la Serna (1640). The latter work was edited posthumously; Gallego’s preface is dated May 1638. The present article complements my article, Blank (2014), 117–136, which touches neither upon the various versions of early modern eduction theories nor on the controversy between Sennert and Gallego. [↑](#endnote-ref-6)
7. On Scaliger’s biological views, see Blank (2010), 266–286; Blank (2012), 503–523. [↑](#endnote-ref-7)
8. Sennert (1636), 16–18 (divine induction); 24–25, 163–164 (multiplication). On the theological background of Sennert’s theory of the multiplication of human souls, see Stolberg (2003), 177–203. On Sennert’s conception of form, see Michael (1997), 272–300; Michael (2001), 331–363. On the connection between Sennert’s conception of forms and his account of spontaneous generation, see Hirai (2007), 477–495. [↑](#endnote-ref-8)
9. Ruvio (1620), 132: “*[P]rima* opinio tenet, quod priusquam generetur res naturalis praeexistebat forma eius actu in materia.” [↑](#endnote-ref-9)
10. Ibid.: “[Q]uidam dixerunt formas omnium rerum praeexistere in quibusdam atomis indivisibilibus, ex quibus res omnes fiunt.” Ruvio refers to Aquinas, *Summa theologiae* I, q. 4, a. 1 [erroneously referred to as a. 8]. [↑](#endnote-ref-10)
11. Ruvio (1620), 132. Ruvio refers to Durandus of St. Porcain, *In secundum Sententiarum*, d. 18, q. 2. [↑](#endnote-ref-11)
12. Ruvio (1620), 132. Ruvio refers to Aristotle, *Met*. VII, 5, section 19 in the Giunta edition (see Ruvio (1542), fol. 161v–162r). [↑](#endnote-ref-12)
13. Ruvio (1620), 132: “Secunda opinio asserit, formas ante generationem non praeexistere ullo modo in materia, nec actu, nec potentia, sed solum in virtute, & potentia cuiusdam superioris agentis, a quo producuntur, sed ab agente immediato uniuntur materiae. Itaque dum generatur ignis ex ligno, forma eius non praeexistebat in materia actu, nec potentia, sed materia ipsa disponitur ab alio igne, per calorem, & siccitatem in eo productam; & in materia sic ab igne disposita producitur forma ignis a quadam intelligentia …” As Pluta has pointed out, such a view can be found in the work of John Buridan, Marsilius of Inghen and Nicholas of Amsterdam (d. ca. 1440); see Pluta (2007), 149–167. [↑](#endnote-ref-13)
14. Ruvio (1620), 132–133. [↑](#endnote-ref-14)
15. Ibid., p. 133: “[N]on fuerit forma actu in materia, quia si sic in ea erat ante generationem; ergo erat ei unita: Probatur consequentia, quia repugnat actu esse in ea, & esse ab ea separatam, sed ex materia, & forma actu existentibus, & unitis resultat compositum; ergo etiam erat compositum, & ideo nihil novum fit per generationem, quod est falsum.” [↑](#endnote-ref-15)
16. Ruvio (1620), 134: “[S]i non praecedit actu, nec potentia … sed solum in potentia activa agentis, evidenter sequitur omnes formas substantiales materiales vere, & proprie creari … Probatur consequentia, nam quod formae sint in potentia activa superioris intelligentiae ante generationem, non tollit creationem earum, nec etiam quod fiant ab ea in materia iam disposita per actionem agentis proximi …” [↑](#endnote-ref-16)
17. On the medieval background of these debates, see Takahashi (2008), 451–481. [↑](#endnote-ref-17)
18. Ruvio (1620), 135. [↑](#endnote-ref-18)
19. Pererius (1579), 338: “1. est, quod tales formae, producuntur ab agentibus materialibus, per actiones materiales, & per dispositiones materiales, hoc est haerentes & infixas in ipsa materia. 2. est, quod tales formae pendent in fieri a materia, hoc est non possunt gigni nisi intra materiam, eique penitus copulatae, non enim per se producuntur & extrinsecus adveniunt & adiunguntur materiae. 3. est, quod pendent a materia in esse; nam extra eam materiam in qua ab initio productae sunt, ne puncto quidem temporis aut per se subsistere, aut in alia materia existere possunt; sed plane idem est eas separari a sua materia, quod ipsas penitus interire. 4. est, quod pendent a materia in operationibus suis, ex quo fit, ut operationes huiusmodi formarum, subiective non sint in forma, sed in toto composito. 5. est, quod pendent a materia quidditative, quamobrem sine ea nequeunt, aut definiri, aut perfecte intelligi.” [↑](#endnote-ref-19)
20. Ibid., p. 364: “nomen quiditatis significant totum id quod pertinet ad integritatem substantiae & naturae ipsius compositi …” [↑](#endnote-ref-20)
21. On Sennert’s theory of animate atoms and its relation to Leibniz, see Arthur (2003), 243–302; Arthur (2006), 147–174; Blank (2011), 115–130. [↑](#endnote-ref-21)
22. Sennert (1636), 162–163: “Concedimus enim sane, formas illas inseparabiles non posse fieri … sine materia, & extra materiam & esse & operari in & cum materia: verum hoc inde non sequitur, quod e potentia materiae educatur forma, & dependentiam essentiae habeat a materia, quae mere passive sese habet.” [↑](#endnote-ref-22)
23. Ibid., p. 167: “Et quocunque modo dispositio illa ad formam explicatur, cum successive per parte fiat, & gradus ultimus ejusdem sit generis & perfectionis cum praecendentibus, actum rei constituere, & substantiae essentiam dare non potest.” [↑](#endnote-ref-23)
24. Ibid., pp. 12–13. [↑](#endnote-ref-24)
25. See Maier (1951); Clagett (1950), 131–161; Solère (2001), 582–616. [↑](#endnote-ref-25)
26. See Shapiro (1959), 413–427; Dudley Sylla (2001), 149–184. [↑](#endnote-ref-26)
27. Sennert (1636), 23. [↑](#endnote-ref-27)
28. Suárez (1866), 13.9.8 (cited according to disputation, section, and subsection): “concluditur, causalitatem materiae, quatenus est forma in fieri, vel formae, vel compositi, non esse aliud quam ipsamet generationem ut essentialiter pendentem a materia, nam mediante illa, concurrit materia ad eductionem formae, vel compositionem compositi: causalitas autem causae nihil aliud est, quam concursus eius. Item, quia causare aliquam rem in fieri, nihil aliud est, quam quod fieri talis rei fit a tali causa: ergo per eadem causalitatem causatur res in fieri, per quam causatur ipsummet fieri rei.” [↑](#endnote-ref-28)
29. Ibid., 13.9.5: “Sicut enim actio est ab agente, non per aliam actionem, sed per seipsam, & habet rationem actionis, ut est ipsa emanatio a causa agente, & ut sic est ipsa causalitas agentis …: ita eductio, seu passiva generatio, quatenus essentialiter pendet a subiecto, & per seipsam necessario illi coniungitur, ab illo causatur materialiter non per aliam causalitatem, sed per se ipsam.” [↑](#endnote-ref-29)
30. Gallego de la Serna (1634), 98. [↑](#endnote-ref-30)
31. Ibid., 18.2.20 (cited according to disputation, section, and subsection): “accidens proportionatum formae substan­tiali posse esse ex natura sua instrumentum accommodatum ad talem actionem; quia licet in ratione entis sit inferioris ordinis forma accidentalis comparata ad substantialem, tamen in modo essendi habent proportionem, si utraque sit pendens a materia; similiter commensurantur in ratione dispositionis & formae, & eadem ratione possunt proportionari in ratione instrumentariae virtutis & actionis, seu termini: nam sicut est connaturale substantiae operari per accidentia sibi proportionata, ita est connaturale illi fieri per accidentales dispositiones sibi proportionatas …” [↑](#endnote-ref-31)
32. Ibid., 15.6.10. [↑](#endnote-ref-32)
33. Ibid.: “Atque ita eademmet unio quatenus est a forma, est medium seu ratio, qua mediante forma actuat materiam, & componit compositum: & hoc modo dicitur esse causalitas formae: quatenus vero per illam forma materiae adhaeret, & sustentatur ab illa, est dependentia eiusdem formae a materia. Est enim tam intrinseca connexio inter huiusmodi formam, & unionem, ut diversis rationibus mutuo inter se pendeant.” [↑](#endnote-ref-33)
34. Gallego de la Serna (1634), 142. [↑](#endnote-ref-34)
35. Ibid. [↑](#endnote-ref-35)
36. Ibid. [↑](#endnote-ref-36)
37. Suárez (1866), 15.6.10: “fatemur enim formam, praesertim illam quae educitur de potentia materiae, non esse proprie causam formalem illius actionis per quam educitur … quia est terminus eius …” [↑](#endnote-ref-37)
38. Gallego de la Serna (1634), 148. [↑](#endnote-ref-38)
39. Sennert (1636), 167. [↑](#endnote-ref-39)
40. Gallego de la Serna (1640), 6: “[C]um totum hoc opus fiat per motum alterativum mediante quo menstrum substantialiter mutatur in carnem, ossa, & in reliquas partes, impossibile est, ut agens naturale, cum habeat limitatam potentiam, subito transeat ab imperfecto ad perfectissimum, sed potius sensim, & particulatim, & per medias quasdam formas ad productionem perfectissimae formae tendat.” [↑](#endnote-ref-40)
41. Ibid. [↑](#endnote-ref-41)
42. Ibid., pp. 8–9: “Quamadmodum enim animae materiales, sive aliae quaecumque formae acquirunt esse in materia, ipsa propter transmutationem substantialem ejusdem materiae, ideoque dicuntur educi ex ejus potestate …” [↑](#endnote-ref-42)
43. Sennert (1636), 234: “[A]nima per se & primo est in partibus, quatenus sunt similares, & non quatenus organicae. In organicis vero saltem est, quatenus constant e similaribus. At similares partes, ut tales, nullam certam figuram habent: & proinde anima non est in iis, ut certam figuram vel quantitatem habent, sed saltem quatenus tales sunt.” [↑](#endnote-ref-43)
44. See Aristotle, *De caelo* II, 8, 290a30–35. [↑](#endnote-ref-44)
45. Gallego de la Serna (1640), 42–43: “nullam rem creatam habere esse propter se, hoc est, habere esse propter solum illud esse, sed habere esse propter suam operationem, quae quidem operatio, quamvis sit se­cundarius effectus, est tamen potissimus, priorique utilior, unde fit, ut nullius rei creatae esse nec momento temporis sine organorum actione existere possit.” [↑](#endnote-ref-45)
46. Sennert (1636), 272. [↑](#endnote-ref-46)
47. Ibid., p. 273: “[V]is coctrix, immutatrix, formatrix, immanens est, nec transit de subjecto in subjectum …” [↑](#endnote-ref-47)
48. Ibid. [↑](#endnote-ref-48)
49. Ibid. [↑](#endnote-ref-49)
50. Ibid.: “Quarto qui opus formationis perficit, ille procul dubio foetum immediate tangat necesse est. At uterus foetum immediate non attingit, sed inter foetum & uterum intercedunt membranae, & illa excrementa aquosa, membranis conclusa.” [↑](#endnote-ref-50)
51. Gallego de la Serna (1640), 7: “[T]otum esse materialium animarum oriatur a generante effective, & a materia subjective; & haec est causa quare dicantur educi ex potestate materiae. Quod nihil aliud est, quam animas istas non fieri separatim a materia, & totum per se fieri per unionem formae cum materia: nam quemadmodum anima canis, v.g. habet naturalem inclinationem ad materiam sibi dispositam: sic materia disposita a cane habet naturalem inclinationem ad formam caninam. Dicitur vero talis anima educi ex potestate materiae, quia potestas, quam habet eadem materia, redacta fuit ad actum per transmutationem factam ab agente …” [↑](#endnote-ref-51)
52. Ibid., p. 15: “[S]atis manifestum est, animam actu informantem corporis, quod informat, conservationem molliri: dispositionem vero ad primam sui introductionem non potuisse facere: nam impossibile est, ut guvernare possit materiam sive subjectum, quod nondum informat.” [↑](#endnote-ref-52)
53. Ibid.: “Unde necessarium est, ut prima ista praeparatio, non fiat a forma introducenda, sed potius ab informato individuo ejusdem speciei, in quo est virtus faciendi alterum sibi simile per materiae non praeparatae substantialem transmutationem …” [↑](#endnote-ref-53)
54. Gallego de la Serna (1634), 158. [↑](#endnote-ref-54)
55. Ibid. [↑](#endnote-ref-55)
56. Ibid. [↑](#endnote-ref-56)
57. Ibid.: “Galenus … semen imperfectius in motu fieri foeminam, & perfectius marem dixit. Esse vero perfectius, aut imperfectius reduxit ad maiorem, vel minorem caliditatem, ad quod physicum principium omnes actiones naturales recovandas esse dixit.” Gallego’s reference is to Galen, *De usu partium* XIV.17. [↑](#endnote-ref-57)
58. On Aristotle’s views, see Henry (2006), 425–455. [↑](#endnote-ref-58)
59. Gallego de la Serna (1634), 158: “Ex dictis igitur omnibus philosophicis fundamentis colligitur foeminam mediante utero agere, ut causa universalis secundum dispositionem materiae, non solum ad accidentalem similitudinem, sed etiam ad similitudinem sexus, quemadmo­dum movetur ad plurium, vel unius foetus generationem, solum sumpta indicatione a quantitate materiae, unde nascitur …” [↑](#endnote-ref-59)
60. Sennert (1636), 273. On Fracastoro’s theory of spiritual species, see Blank (2008), 137–159, especially pp. 142–144. [↑](#endnote-ref-60)
61. Gallego de la Serna (1640), 67: “Ego autem, qui per naturae regiam, amplamque viam iter facere semper curo, nullo modo absentem judico animam ab iis objectis, quae intra sui corporis terminos compraehensa habet, circa quae objecta solo contactu virtuali operatur: hepar enim chilum in intestinis existentem virtute attractiva attrahit, ut caput ex infernis venis sanguinem, ut summitates arborum humorem ex terra sugunt. Et facultates, quae externorum alimentorum commutationi intendunt, idem contingit. Nam quamvis ventriculi substantia solum tangat ingestorum alimentorum superficiem, praesertim in voracibus atque potatoribus, totam tamen eorumdem alimentorum commutat molem.” [↑](#endnote-ref-61)
62. Ibid. [↑](#endnote-ref-62)
63. Ibid., pp. 68–69: “Ego autem non dico membranas istas esse partes constituentes foetum … sed esse partes factas, viventesque, & animatas, saltim vita vegetativa ab utero, & continuitate actionum reliquum totius generationis opus perfici … Quod vero virtutes istas a certis naturis manantes ad extra Sennertus spirituales crasso modo appellet, sive corporales ut revera sunt, transeat, dummodo fateatur, aliquorum compositorum corporum virtutes inveniri, quae non ut primae qualitates, sed, ut virtutes totius substantiae in virtute sui suppositi extra ipsum operantur …” [↑](#endnote-ref-63)