**Nicolaus Taurellus on Vegetative Powers and the Question of Substance Monism**

**Andreas Blank**

**Abstract**  This article analyzes the treatment of vegetative powers in Nicolaus Taurellus’s critical response to Andrea Cesalpino. Taurellus’s interest in this topic derives from larger metaphysical and theological concerns. His concern is that Cesalpino’s view that vegetative powers are due to a divine principle of activity inherent in natural particulars leads to a version of substance monism that is incompatible with the Christian doctrine of creation. Taurellus’s critique can best be understood within the context of his defense of an immaterialist account of the basic constituents of reality, which is connected with an emergentist account of the origin of vegetative powers.

**1 Introduction**

Vegetative powers, especially the powers involved in the generation and nutrition of plants and animals, are prominent themes in Nicolaus Taurellus’s *Alpes Caesae* (1597).[[1]](#footnote-1) This work is a thousand-page book review of Andrea Cesalpino’s *Quaestiones Peripateticae* (1571/1593). Cesalpino’s work became influential at the University of Altdorf, where Taurellus held a professorship in medicine, and Taurellus’s opposition to this influence cannot solely be explained by diverging views concerning the correct interpretation of Aristotle but rather are motivated by what Taurellus regarded as impious implications of Cesalpino’s readings of Aristotle. As I will argue, Taurellus’s detailed discussions of Cesalpino’s account of the origin of vegetative powers can be understood as being motivated by Taurellus’s opposition to Cesalpino’s conception of God as a unique active intellect inherent in natural particulars. Taurellus used the analysis of vegetative powers to spell out a sense in which living beings can be regarded as substances, as opposed to the substance monism that Taurellus saw as an implication of Cesalpino’s natural philosophy.

Neither *Quaestiones Peripateticae* nor *Alpes Caesae* are easy readings. Taurellus does not get tired of pointing out how opaque many passages in Cesalpino’s work are, and he is certainly right about that. But in spite of its enormous length, Taurellus’s response to Cesalpino is itself often stenographic and replete with irony, puns and invectives (the title of the book—something like *The Alps Torn Down*—itself being a polemical pun on Cesalpino’s name). Nevertheless, both in Cesalpino and Taurellus it is possible to discern coherent threads of thought concerning central themes in early modern natural philosophy, especially the theory of biological reproduction and its connection with issues such as the nature of elements, mixtures and the origin of vital powers. Taurellus’s critique of Cesalpino is not an example of one philosopher talking past another. This is so because Cesalpino and Taurellus share the belief that vegetative powers cannot be reduced to the causal powers of elements. Their disagreements concern the question of how a reductionist position could be avoided. Cesalpino took up the medical tradition that regarded subtle matter (or “spirits”) contained in plant and animal seeds as the carriers of vital heat that he regarded both as the origin of vegetative powers and as a divine principle inherent in nature. By contrast, Taurellus tried to eliminate such subtle matter from his ontology and, in contrast to Cesalpino and most of his contemporaries, even refused the reality of primary matter that is traditionally understood to be the substrate of substantial forms. As it turns out, the reasons for Taurellus’s rejection of primary matter have to do with his worries concerning substance monism. And the implications of this rejection are far-reaching because it leads Taurellus to the view that the basic constituents of reality are immaterial entities that are bearers of active and passive forces that bring forth both corporeal beings and higher-order forms. Using such immaterial entities as the basis of the eduction relation is what makes Taurellus’s account unique in the field of early modern theories of vegetative powers.

In what follows, I will support these claims by reading the relevant passages from *Alpes Caesae* against the background of three of Taurellus’s other works. The first is his most comprehensive work in metaphysics, *The Triumph of Philosophy* (1573), which pursued the plan to provide a unified account of philosophical and theological truth and thereby to offer a philosophical defense of the doctrine of creation (Taurellus 2012, 220–222, 250–252; for overviews of Taurellus’s metaphysics, see Petersen 1921, 219–258; Mayer 1959; Leinsle 1985, 147–165; Wollgast 1988, 148–153). Using a text such as *Philosophiae Triumphus* to elucidate a text that was written almost 25 years later requires some justification, but this justification is forthcoming easily since in *Alpes Caesae* Taurellus refers the reader back to his earlier treatment of the generation of humans (Taurellus 1597,132; 134). Hence, Taurellus seems still to subscribe to the essentials in his earlier work (although, as we shall presently see, there is at least one significant modification to the account of elements as outlined in *Philosophiae Triumphus*). This is why it seems highly plausible to use *Philosophiae Triumphus* to elucidate some passages in *Alpes Caesae* that, due to their extremely sketchy nature, are difficult to interpret when taken in isolation. The second co-text considered here will be Taurellus’s commentary on Aristotle’s *De vita et morte*. The chronological closeness of this text to *Alpes Caesae*, published a year later, as well as the thematic closeness of the issues discussed make this a natural point of reference.[[2]](#footnote-2) The third co-text will be Taurellus’s unpublished *De procreatione hominis theses medicae*, which is preserved in an undated manuscript at the Municipal Archive of Nuremberg.[[3]](#footnote-3) The text was written for the doctoral disputation of one of Taurellus’s students at the University of Altdorf, but, in line with academic practice in early modern Germany,[[4]](#footnote-4) two references in *Alpes Caesae* identify Taurellus as the author of this work (Taurellus 1597,819; 833).

**2 Vegetative Powers and the Problem of Substance Monism**

Cesalpino’s vindication of a version of substance monism is what triggered some of the most interesting parts of Taurellus’s polemical response. In his preface, Taurellus makes clear that one of the main targets of his criticism is Cesalpino’s conception of God. As Taurellus points out there, in a crucial respect Cesalpino goes beyond Averroes:

What [Averroes] said about the assisting intellect, Cesalpino extends to the souls of humans and of the other animals, and of the entire world, for Cesalpino asserts that a single soul exists by itself and is multiplied according to the bodies of living beings. And through participating in it, the bodies are animated and substances. (Taurellus 1597,25)[[5]](#footnote-5)

Taurellus is clear that such a conception implies that God is not separated from matter and also is not an efficient cause of things; rather, God is understood as a constituent cause (Taurellus 1597,25–26).[[6]](#footnote-6) What is more, Cesalpino’s conception of God seems to imply substance monism not only with respect to all animate beings but also with respect to the world as a whole.

In fact, substance monism seems to be an implication of a combination of views held by Cesalpino: (1) the view that the active intellect is a substance that is capable of self-reflection; (2) the view that the active intellect “perfects everything”; and (3) the view that the active intellect “implants into things a striving for perfection insofar as it is intellection.”[[7]](#footnote-7) Thus, the substantiality of the active intellect is characterized as being due to its capability of self-reflection, and it is this specific activity that is understood as the origin of the activity of natural things, not only of minds. Due to the relation between the unique active intellect and a plurality of natural things, Cesalpino holds that there is more than one sense in which unity is the origin of multiplicity:

Nature therefore is intellect, insofar as only one exists, and at the same time it belongs to many, while by itself, it belongs to a single disposition, as [color] belongs to whiteness and [at the same time] to blackness insofar as it is the removal of whiteness. … Hence, from what has been said it is clear how a single intelligence contains all the acts of understanding things, for it is like the measure of all things. However, it is evident that things relate to each other as acts of understanding do; hence, it is not impossible that a multiplicity arises from the one. This also becomes clear from the reduction of entities to the one and from the way in which the kinds of substances are described according to addition and subtraction …. Hence, insofar as it is simply and is described with respect to the subtraction of all matter, there is a unique and simple substance. (Cesalpino 1593, fol. 35v–36r)[[8]](#footnote-8)

Thus, one sense in which multiplicity arises from the one has to with the dependence of things on the divine understanding. A plurality of things comes about because there is a plurality of divine acts of understanding, to which the things correspond. Another sense in which multiplicity arises from the one has to do with the role of matter in bringing about plurality. This is the sense in which Cesalpino speaks of “addition” and “subtraction”: “adding” matter to the single incorporeal substance leads to a plurality of natural beings, “subtracting” matter from the plurality of natural beings leads to the single incorporeal substance.

Concerning the question of whether the intellective, sensitive and vegetative aspects found in humans are qualities of one and the same immaterial substance, Cesalpino argues that there is an experiment with a non-human animal that can decide the question: If a worm is divided, all of the vegetative and sensitive powers of the soul can be observed that were observable in the whole, “as if they were inseparable from each other” (Cesalpino 1593, fol. 43r). By analogy, Cesalpino suggests, in humans the vegetative and sensitive powers depend on the intellective powers; but if the intellective powers are understood as deriving from the participation of human beings in the unique active intellect, then humans are an example for how in organic beings, together with the material form, there is also an immaterial form—not in the sense of the presence of two distinct substances but rather in the sense that the unique active intellect communicates corporeal activities to the human body and intellective operations to the human soul. Both corporeal and intellective operations thus participate in the unique active intellect. As Cesalpino conjectures, this could be the sense of Thales’ saying that everything is full of gods (see Aristotle, *De anima*, I.5, 411a8) (Cesalpino 1593, fol. 43r). And Cesalpino’s argument for explaining vegetative powers through the influence of the unique active intellect is the consideration that, if vegetative powers have the function of securing the eternity of species, and if something eternal can only arise from something eternal, then the generation of living beings must be due to an active principle that itself is incorruptible (Cesalpino 1593, fol. 44r).[[9]](#footnote-9) And, as Cesalpino argues, neither singular corruptible beings, nor all causes taken together, can be the cause of the eternity of species. This leads him to the conclusion that “[e]very soul, or part of a soul, of mortal beings therefore may seem to participate in the divine itself …” (Cesalpino 1593, fol. 44r).[[10]](#footnote-10)

This account of the participation of natural particulars in the unique active intellect raises the question of the sense in which Cesalpino speaks of different “kinds of substances” that arise through the addition of matter. Earlier in the text, Cesalpino explains that he regards the concept of substance to be equivocal. Generally, he remarks that the different ways in which things are distinguished from each other depend on the different ways in which things “participate in being,” that is, on the different ways in which things “descend from a unique substance” (Cesalpino 1593, fol. 9v).[[11]](#footnote-11) Accordingly, he claims that substance is not a “univocal genus” but rather allows for equivocations. In fact, he argues that such equivocations occur in more than one sense. Cesalpino takes up the thought from Aristotle’s *Metaphysics* VII.7 (1033a12-26) that not only form-matter composites, but also the matter and the forms that constitute beings such as animals and plants can be called substances (Cesalpino 1593, fol. 10r). As Cesalpino explains, the difference between these different senses of “substance” is that even if neither matter nor the composite are unities, they are directed towards something that is a unity, namely, form: matter is substance because it is form potentially, and the composite is substance because it possesses form (Cesalpino 1593, fol. 10r).[[12]](#footnote-12) Thus, according to the first way of disambiguating the notion of substance, there is a sense of substantiality that is derivative on the substantiality of forms—a sense of substantiality that denotes certain relations between other beings and forms. Moreover, disambiguating the notion of substance in this way allows for a plurality of substances, even if it should turn out that the number of substantial forms is exactly one.

This possibility is taken seriously in Cesalpino’s explication of the second sense in which substances do not constitute a univocal genus. Here, Cesalpino takes up the thought from Aristotle’s *Metaphysics* XII.5 (1070b36-1071a1) and XII.8 (1073a23-1073b1) that there are three kinds of substances: two natural, one immobile; two eternal, one capable of being generated and undergoing corruption. As Cesalpino understands it, the distinction is between the divine substance, mathematical substances, and physical substances (Cesalpino 1593, fol. 10r-v). Moreover, he explains the sense in which all these different kinds of beings can be understood as kinds of substances as follows:

[T]hese three genera of substances are proportional to each other. For all of them underlie certain affections, and always the substance is prior and the cause of the others. For this reason, they come together in an analogous genus. (Cesalpino 1593, fol. 10v)[[13]](#footnote-13)

This is the second sense in which, in Cesalpino’s eyes, natural beings can count as substances, even if they owe their being to a single, divine substance: Once they have been individuated through the composition of a singular portion of matter and a part of the active, divine intellect, they become bearers of qualities and relations of their own. In these two ways, well documented through extended quotations in Taurellus’s *Alpes Caesae*, Cesalpino uses insights from Aristotle’s *Metaphysics* to disambiguate the notion of substance, which would allow reconciling the view that the active, divine intellect is a unique substance with the view that nevertheless there is a plurality of natural substances.

**3 Elements and the Question of Substantiality**

In response to Cesalpino, Taurellus defends a version of substance pluralism that does not derive from the view that the concept of substance is an equivocal concept. Rather, Taurellus defends the view that the concept of substance is a *univocal* concept—a concept allowing only a single meaning. His arguments are based on *ad-hominem* criticism of Cesalpino, but also on some deep layers of his own metaphysics. As to the *ad-hominem* criticism, Taurellus is quick to point out that the experiment that Cesalpino regarded to be decisive—cutting worms into parts—allows for alternative explanation. For instance, one could argue that the continuing life, sensation and motion of the worm parts are just caused by animal spirits, the continued presence of native heat, and favorable external influences (Taurellus 1597,309). If such an explanation is successful, then the experiment does not show that animal souls are divisible, nor that vegetative and sensitive soul powers are present in all worm parts. On the contrary, Taurellus goes on to argue, the separation between vegetative, sensitive, motive and intellective powers can be observed in many body parts: some are nourished without being sensible; some are sensible without having motion; some have all three qualities without having intellection (Taurellus 1597,309).

As to Cesalpino’s central claim—the claim that in material forms there is at the same time something immaterial—it is evidently not enough to point to experiences of this kind since Cesalpino regards vegetative powers as something that participates in the divine substance even in the absence of sensation and intellection. On the level of diagnosis, Taurellus is clear that Cesalpino’s conception amounts to the view that “the substance of God and of all other things are confused in such a way that each thing in some respect is said to be god himself” (Taurellus 1597,309).[[14]](#footnote-14) But what is wrong with regarding God as a constitutive cause of all things? Taurellus only remarks that he has written about these matters copiously in his metaphysics—that is, in *Philosophiae Triumphus* (Taurellus 1597,309). And this is how some deep layers of Taurellus’s metaphysics become relevant for his response to Cesalpino. In *Alpes Caesae*, he only alludes rather cryptically to these deep layers. One of his allusions concerns his view that, if matter and form are understood to be complementary entities that cannot exist without each other, then there is no reason to regard them as substances:

If substance is said to be that which subsists by itself, then this genus will be univocal. But you may say that matter does not subsist by itself; nor does form; but matter and form nevertheless should be substances in such a way that they are parts of substance. Let me say what comes to my mind. I wonder whehter there is any substance or part of substance … that could not subsist by itself, separately, But about these matters elsewhere. (Taurellus 1597,25)[[15]](#footnote-15)

A second allusion concerns a consequence that, in his view, follows from this consideration, namely, that matter should not be understood as a constituent of natural things but should rather be thought of as the “nothing” out of which creation (in the sense of *creatio ex nihilo*) took place (Taurellus 1597,26).[[16]](#footnote-16) These are fascinating ideas that Taurellus developed in much detail in his earlier *Philosophiae Triumphus* (1573), and to which he refers frequently in *Alpes Caesae*.

As Taurellus argues in *Philosophiae Triumphus*, the relation between forms and primary matter raises a problem concerning the sense in which forms can be regarded as something substantial. Taurellus remarks that the Aristotelian principles “want matter which is nothing by itself to be something accidentally. For if this is true, it will be an accident, not a substance …” (Taurellus 2012, 240).[[17]](#footnote-17) Something analogous holds for the conception of form in the Aristotelian tradition: “The natural philosophers have stated that natural forms cannot subsist without a subject; if this were admitted, they would not be substances but accidents, because substances are not in something or from something but subsist through their own force, while one says of accidents that they do not subsist but rather are in something” (Taurellus 2012, 318).[[18]](#footnote-18) By contrast, a theory of immaterial forms is exactly what yields an analysis of the substantiality of elements. This is so because, once the assumption that form depends existentially on prime matter is given up, there is no need to regard form as an accidental being: “Tell me, does nature subsist by itself or does it subsist in something other? If you say that nothing underlies it, why shouldn’t one be allowed to ascribe the same to form, such that it is nature and subsists without matter?” (Taurellus 2012, 376).[[19]](#footnote-19)

For this reason, Taurellus eliminates prime matter from his ontology and accepts only a metaphorical usage of the notion of prime matter. As he puts it, with respect to God, prime matter is “the NOTHING” (in capital letters) out of which God creates the world (Taurellus 2012, 484). When he calls prime matter “nothing,” what Taurellus has in mind is a strict identity statement. This is why it is a suitable metaphor for what is there before the divine act of creation, namely, no created being. Prime matter in this metaphorical sense is absolute non-being. What we are left with on the basic level of reality thus are immaterial, form-like entities. And since they are not accidents because there is nothing in which they could inhere, there is also no reason to assume that they could be accidents of a unique divine substance. This is crucial for Taurellus’s characterization of the relation between God and the world: “Because the world is separated from God by its substance, it is not conjoined with him from eternity” (Taurellus 2012, 426).[[20]](#footnote-20) The ensuing view of the relation between God and creatures accepts creation dependence of creatures on God but denies the dependence of creatures’ continued subsistence on God.

If one compares the position taken in *Philosophiae Triumphus* with that taken in *Alpes Caesae*, one significant modification comes to the fore. In the later work, Taurellus comments upon Cesalpino’s claim that passive qualities such as humidity and dryness constitute the forms of elements (Cesalpino 1593, fol. 50v-51r):

Why [do they] not [constitute] matter? It does not belong to form to be the subject but to matter. But heat and coldness are added to humidity and recede from it. Coldness informs humidity such that water arises; heat [informs humidity] such that air arises (Taurellus 1597, 405).[[21]](#footnote-21)

But Taurellus is also not satisfied with a solution that would take passive qualities to be constitutive of matter and active qualities to be constitutive of forms: “If active qualities were forms of elements, they certainly would be accidental forms, not essential forms; because they can be separated [from passive qualities] without the corruption of their subject” (Taurellus 1597, 404).[[22]](#footnote-22) From the consideration concerning the separability of active and passive qualities, Taurellus draws the conclusion that active and passive qualities cannot constitute a *single* form. For this reason, Taurellus gives up the view articulated in *Philosophiae Triumphus* according to which active and passive powers are inherent to the forms that function as elements (Taurellus 2012, 284; 292-294).[[23]](#footnote-23)

But he also does not return to a traditional conception of prime matter. Rather, Taurellus uses the idea of a hierarchy of forms to explicate a sense in which one can speak about matter without being committed to matter as a constitutive principle of natural things. Already in *Philosophiae Triumphus*, his reinterpretation of secondary matter in terms of subordinate forms allows Taurellus to continue to talk about bodies (*corpora*) and corporeal beings (*entia corporalia*) (see Taurellus 2012, 160-162; 182; 352-354; 552-554). As he puts it, “if it is not understood as a less noble form, … matter does absolutely not compose anything” (Taurellus 2012, 278).[[24]](#footnote-24) In *Alpes Caesae*, Taurellus uses the subordination relation between forms to explicate the sense in which passive qualities can be said to be characteristic of what one could call the “matter” of elements. According to his revised view, forms, in so far as they function as forms, are always active. But in so far as forms can be subordinate to other forms, they can be said to be passive: “Form is passive not in so far as it is form but in so far as it is matter” (Taurellus 1597, 406).[[25]](#footnote-25) Consequently, Taurellus still uses the notion of form to analyze the nature of elements, but he regards elements as composites of *two* forms one of which functions as the matter of the other (Taurellus 1597, 612). This is a significant modification in the ontology of the basic constituents of reality; but it is a modification that still operates within the framework of an immaterialist ontology. And if the point of immaterialism about the basic constituents of reality is to guarantee the substantiality of created beings, then the modified version of Taurellus’s ontology still fulfils the same purpose.

4 Vegetative Powers and the Emergence of Substantial Forms

Taurellus’s immaterialist ontology implies that composites can be composed only of immaterial beings. As Taurellus puts it: “Matter plainly does not exist, and nothing but forms can be and can enter composition” (Taurellus 2012, 280).[[26]](#footnote-26) Evidently, this raises the question of where the vegetative powers characteristic of particularly complex composites come from. Here it is interesting to see that Taurellus integrates a version of emergentism into his immaterialist ontology. Emergentism—the view that, once material composites have reached some level of complexity, potencies arise that cannot be reduced to the potencies of the constituents (see Macdonald and Macdonald 2010)—was clearly articulated by some ancient thinkers, including Galen and the Aristotelian commentators Alexander of Aphrodisias and John Philoponus.[[27]](#footnote-27) According to Alexander of Aphrodisias, the soul “is a power and form, which supervenes through such a mixture upon the temperament of bodies; and it is not a proportion or a composition of the temperament” (Alexander of Aphrodisias 2008, 104; Alexander of Aphrodisias, 2012, 51). Jacob Schegk (1511-1587), Taurellus’s teacher at the University of Tübingen, took up this idea. In his commentary on Alexander’s *On Mixture*, Schegk describes the role of the tempering of elemental qualities in mixture as follows:

Those entities that constitute a temperament are first divided and split up amongst each other into minute parts, then their activity is gradually diminished through the composition of minimal parts …, and third, as it were through some agreement, they jointly bring about a single form of the entire mixed body. (Schegk 1540, fol. 65r; see Todd 1976, 158 [*De mixtione* 233.2-5]).[[28]](#footnote-28)

According to this account, a substantial form of the mixture arises through the tempering of elementary qualities. Similarly, Taurellus writes:

[W]hen by mutual action and passion mixed things are changed in such a way that none of them remains entirely the same, but some new form arises out of them that relates to the forces of all of them, then without doubt there exist mixed forms that have the forces of many, and that bring about different effects, which is most evident in the changes of things and especially in the use of medicaments. (Taurellus 2012, 272)[[29]](#footnote-29)

Taurellus maintains that what arises in genuine mixture is not only a composition of simple compounds but also a form. In his view, this form is simple “because it is not composed but rather generated” (Taurellus 2012, 42). Such a form differs from the mere composition of elementary forms: “Because through generation a really unique being arises, namely the substantial form, we hold that this is not simple with respect to conjunction or some other accident and also not composite, no matter whether it derives from a single being or many beings” (Taurellus 2012, 274).[[30]](#footnote-30) Thus, there is a sense in which emergent forms are complex—they are bearers of a plurality of qualities without having parts from which they are composed, even if they arise from a composite that has such parts. Consequently, a form that emerges from the simple constituents of a composite cannot undergo a process of being split up, although it can perish when the basis from which it emerges is changed (Taurellus 2012, 274). This is why the simplicity and immateriality of emergent forms is compatible with their capability of being destroyed (Taurellus 2012, 44).

In Taurellus’s commentary on Aristotle’s *De vita et morte*, this line of thought is applied to the question of the origin of vegetative powers. There, vegetative powers in plants are treated differently from vegetative powers in animals, while the treatment of vegetative powers in brutes and humans is so strikingly similar that Taurellus faces considerable theological challenges, which he tries to solve within the framework of an emergentist ontology. As to vegetative powers in plants, Taurellus follows the Galenic tradition in holding that the nutrition and augmentation of plants has to be ascribed to natural principles other than souls (Taurellus 1586, sig. B3r; see Galen, *De naturalibus facultatibus* 1.1). He takes the postulation of vegetative souls in plant to be superfluous because nutrition is brought about by natural potencies (Taurellus 1586, sig. B3v). As he argues, this can be gathered from the fact that augmentation, diminution, attraction, alteration, and expulsion—the processes underlying vegetative powers—can be found also in inanimate beings (Taurellus 1586, sig. Cv).

However, Taurellus’s rejection of plant souls does not imply that only the elements are operative: “We define nature not only as the temperament but also as the proper and essential form of each body; if you confuse this with the temperament, such that you reduce it to the elements, you go far astray” (Taurellus 1586, sig. G3r). In line with his theory of the emergence of substantial forms, he ascribes to each plant part a substantial form that accounts for some of the activities of the organic plant body (Taurellus 1586, sig. B3v)—activities that cannot be explained by the temperament of elementary qualities (Taurellus 1586, sig. G3r). As he summarizes: “We … maintain that in seeds there is a power by means of which they are converted into plants; and that the forms of plants arise from nothing else but out of seeds. But this power capable of generating plants is not a soul but a nature. For out of this own essential form plants produce seeds” (Taurellus 1586, sig. B5r).

As Taurellus argues, it is necessary to postulate the existence of such natural forms in plant parts because not all kinds of attraction relevant for operation of plants and their seeds can be explained by the agency of elementary heat (Taurellus 1586, sig. B5v). Thus, plant forms and seed forms possess new causal powers that go beyond the causal powers of the elements that function as the matter of the emerging form. These new causal powers explain the difference between fire, which continuously regenerates itself by using up fuel, and life: “Living substances do not live through subject matter, but by themselves, without any supply or change of substance, and are not generated by being alive” (Taurellus 1586, sig. F6v). As Taurellus puts it, life “is the power of a substance through which the other actions of a living being, as their foundation …, are triggered and animated” (Taurellus 1586, sig. F7r). This is why he takes life to relate both to primary actuality—in the sense that life depends on the presence of a substantial form—and to secondary actuality—in the sense that it manifests itself in characteristic activities found only in living beings (Taurellus 1586, sig. F6v).

As to vegetative powers of brutes and humans, Taurellus regards the substantial forms from which these powers are brought forth to be souls. As he argues, if the human soul is generated out of matter, then the seed is the most suitable portion of matter from which the generation of the soul takes its origin (Taurellus 2012, 12). This is so because not everything that proceeds from a corporeal seed is necessarily corporeal. For instance, the souls of brutes are incorporeal substances that proceed from their seeds (Taurellus 2012, 18). However, this does not imply that Taurellus would ascribe animal souls to animal seeds or human souls to human seeds. Rather, he defends the view that in the seed the features of an animal are not contained actually but potentially (Taurellus 1604, 20). Something analogous holds for the human seed: “Many things are in the human seed that is unknown to the nature and forms of each element. This is the essential form of the seed, due to which its corporeal bulk is easily transformed into the various parts of the human body” (Taurellus 1604, 19). Thus, as in the case of non-human animals, human seeds possess substantial forms of their own, which determine through formal downward causation the structure of bodily parts, from which subsequently the human soul emerges. From this ensues a circle of causation: the life of the soul is communicated to the body (Taurellus 1586, sig. Gr); but the life of the soul is also perfected by actions that it can only carry out by means of the body (Taurellus 1586, sig. Gv). Consequently, the soul perfects the body, the body perfects the soul (Taurellus 1586, sig. G2r).

Treating non-human and human souls in an analogous way obviously raises theological issues: Would not regarding non-human souls as immaterial beings render them as immortal as human souls were thought to be? Would not regarding human souls as emerging from organized matter render them as mortal as non-human souls were thought to be? In *Philosophiae Triumphus* Taurellus considers a creation theory of the origin of human souls (Taurellus 2012, 144), but he also voices doubt concerning such a theory. In particular, he cautions that an act of divine creation would render the imperfection of human souls inexplicable (Taurellus 2012, 166). Moreover, he argues that if the soul is infused from the outside, then humans would lack the capacity shared by plants and brutes to generate beings of the same kind. Otherwise, humans would give birth to human bodies, but God would generate the human soul. However, as he objects, producing a being of the same species is a most natural process (Taurellus 2012, 13). Also, in his view the imperfection of human souls speaks against a celestial or divine origin of human souls (Taurellus 2012, 166).

Accordingly, other passages in his commentary on *De vita et morte* point in a different direction. In these passages, he offers an integrated naturalistic account of the origin of the souls of non-human animals and humans. As he surmises, human souls have in common with the soul of brutes that “they necessarily have their essence and life in a body” (Taurellus 1586, sig. G4r; see Taurellus 1604, 11). Therefore, he claims that “the human soul by itself is capable of ceasing to be” (Taurellus 1586, sig. F4v). As in the case of all other natural forms, Taurellus holds that the human souls cannot undergo corruption in the sense of a dissolution into parts. However, since he holds that immaterial animal souls can cease to exist (Taurellus 1604, 21), he maintains that human souls by themselves are capable of ceasing to be (Taurellus 1586, sig. F4v). On first sight, this conclusion seems to be incompatible with the Christian doctrine of the immortality of the soul.

Taurellus is clear that, if body and soul perfect each other, there are two possibilities with respect to immortality: either the human soul is as mortal as the soul of brutes, or resurrection must include the body (Taurellus 1586, sig. G2r). However, he sees room to argue that in this respect there may be a dissimilarity between the souls of humans and non-human animals. In his view, this is so because, by Divine will, human beings are goals in themselves, while brutes are subservient to humans. Hence, brutes can fulfil their goal without immortality, but immortality is required for the fulfilment of the goal of humans (Taurellus 1586, sig. G4r-v). Thus, Taurellus uses theological considerations to show why the goal-directedness of the souls of brutes does not require assuming that they are immortal, while the goal-directedness of human souls requires assuming that human souls are immortal. Consequently, he does not challenge the theological idea of immortality. Rather, he argues that because humans are constituted not only by souls but also by bodies, felicity must be ascribed to soul and body together (Taurellus 2012, 562). This is why he believes that God does not want that the body perishes entirely (Taurellus 2012, 556). Taurellus concludes that if human beings are immortal, the relevant supernatural divine agency responsible for resurrection must relate to soul and body alike (Taurellus 1604, 26). Reinterpreting the idea of resurrection such as to include a human body from which the human soul emerges allows Taurellus to integrate an emergentist view of the human soul with the theological doctrine of immortality.

5 Vegetative Powers and Substance Pluralism

This, then, is the ontological framework in which Taurellus develops his critique of Cesalpino’s account of the origin of vegetative powers. The univocal concept of substance that Taurellus defends is illuminating with respect to the question of substance monism since it allows for creation dependence—natural things would not exist if a divine act of creation did not take place—but also allows for activity independence—natural things are active without the influence of any continued divine agency—and for persistence independence—natural things do not need any divine agency in order to persist in being.[[31]](#footnote-31) Taurellus’s concept of substantiality contrasts sharply with Cesalpino’s view that created beings possess substantiality only by participating in an inherent divine principle of activity. The reason for Taurellus’s interest in Cesalpino’s consideration of vegetative powers is easy to see. As it turns out, what Cesalpino says about the generation of living beings is closely connected with his view that the notion of substance is an equivocal notion.

Cesalpino assigns to living beings a status of being substances; however, because, in his view, substantiality depends on the presence of a divine principle of activity, he restricts the notion of substance to the notion of soul: As he puts it: “Separate elements … do not contain actually this divine being, but only potentially, but mixtures contain it actually; and for this reason, they are actually substances” (Cesalpino 1593, fol. 22r-v).[[32]](#footnote-32) He derives support for this from a reading of Aristotle’s *Meteorology* IV.3 (381a9-12), where putrefaction—a process that only bodies that contain moisture, such as nutriments, can undergo—is described as separation and aggregation of parts (Cesalpino 1593, fol. 23r).[[33]](#footnote-33) If putrefaction is nothing but a separation and aggregation of parts, then the generation of inanimate composites, Cesalpino concludes, cannot be anything but the compositions of parts (Cesalpino 1593, fol. 23r). Consequently, metals and stones and all mixtures that lack animal power are not substances (Cesalpino 1593, fol. 23r-v). By contrast, Cesalpino holds that those composites that are substances owe their substantiality to the presence of vital heat, which he interprets as a divine principle. Cesalpino presents this view as a commentary on Aristotle’s view that the heat of the fertile seed is not fiery but stands in an analogy to the heavenly bodies (*De gen. an.*, 736b29-727a7).[[34]](#footnote-34) What is distinctive about Cesalpino’s interpretation of this passage is his thesis that *all* animals that are generated sexually also could be generated spontaneously, without the intervention of seeds. As he argues, this is so because if celestial heat is what makes seeds fertile, then celestial heat could produce the same effect in other portions of matter as well (Cesalpino 1593, fol. 109r).

Taurellus raises a series of objections against Cesalpino’s speculations concerning spontaneous generation. For instance, he asks why, if celestial heat is assumed to be everywhere, why does Cesalpino believe that putrefaction is necessary for spontaneous generation (Taurellus 1597, 102)? Also, he presses Cesalpino to explain why celestial heat should be capable of fulfilling the function of souls (Taurellus 1597, 102). As he notes, if celestial heat could fulfil the function of souls, then the world as a whole would be animate (Taurellus 1597, 102). And he objects that, if all mixtures were already animated, then there were no genuine generations of animals (Taurellus 1597, 102). Also, if spontaneous generation were due only to celestial heat, then it would become inexplicable why plants and animals are not generated out of whatever mixture (Taurellus 1597, 103). And finally, if everything were animate due to the presence of celestial heat, why should elements be thought to be inanimate? (Taurellus 1597, 103)

The internal difficulties of Cesalpino’s account of celestial heat lend plausibility to Taurellus’s alternative account: “The seed is one thing; the fertile seed is another thing. For the generation of an animal not only a seed but a fertile seed is required. Even if the sun can perhaps make a seed fertile—about which there is warranted doubt—the sun nevertheless cannot make a seed” (Taurellus 1597, 790).[[35]](#footnote-35) As Taurellus argues in line with his emergentist views, heat cannot be enough to bring forth vegetative powers because a fertile seed requires an essential form as a primary agent, while heat can only be an assisting or instrumental cause (Taurellus 1597, 791). This can be inferred through the observation that sun heat is present in inanimate bodies: “The heat of the seed is not by itself fertile. For if it is in dirt, or some other matter, it has no fertile power” (Taurellus 1597, 791).[[36]](#footnote-36) Consequently, Taurellus takes the sun to be a common cause, and if so, then something applies to the sun that applies to all common causes: they can have only common effects. For this reason, the sun heat is insufficient to explain the occurrence of a plant or an animal of a particular species, in contrast to the occurrence of a plant or an animal of a different species (Taurellus 1597, 791).

What is more, Taurellus takes seminal heat to be a quality that arises from the temperament of elements and, therefore, distinguishes it from celestial heat:

[S]eminal heat and sun heat do not have the same power. For if the seed loses its native heat and receives as much heat as it had before only from the sun, it does not become fertile. Nor is native heat enough to make the seed fertile. For if the seed is hotter than would be just or more humid, or suffers from some other defect, it is infertile. Whatever we may say about solar heat, we cannot say the same about the essential form of the seed which only the testicles can bring about, since so many material conditions are required for fertility. (Taurellus 1597,792)[[37]](#footnote-37)

Thus, seeds that, due to a disbalance of their temperament, have become infertile cannot become fertile again only through the influence of sun heat. But also, the elementary heat inherent in seeds cannot be understood by itself as the origin of vegetative powers because any excess in elementary qualities leads to infertility. This is why Taurellus holds that vegetative powers must be the effect of a seed form that emerges from a particular structure of the mixture of the seed.

In Taurellus’s view, these considerations have implications for the question of whether any living being that is generated sexually also could have been generated spontaneously. As Taurellus argues, in order for a human seed to be produced spontaneously, the same material conditions would be required outside the human body as they are found within the human body; and he takes it to be doubtful that the sun could bring these conditions about (Taurellus 1597,793). Something analogous holds for the case of spontaneous generation where “some seminal power inheres in putrefying matter, of the kind that inheres in the perfect seed, but less perfect. Therefore, the reason of the generation of animals has to be attributed primary not to heat, but to this matter” (Taurellus 1597,794).[[38]](#footnote-38) Thus, Taurellus does not exclude the possibility of spontaneous generation but rather holds that in all cases of spontaneous generation the origin of vegetative powers must be explained by new causal powers that emerge from the specific structure of compounds.

Taurellus offers his emergentist views also as a remedy for the weaknesses of Cesalpino’s account of sexual generation. Cesalpino still adheres to an Aristotelian one-seed theory of sexual generation according to which the female contributes only matter, while the male contributes the spirit that contains vital heat (Cesalpino 1593, fol. 112r-v). Taurellus offers the hypothesis of substantial forms emerging from the mixture of male and female seeds as an alternative to Cesalpino’s hypothesis of celestial heat as the origin of vegetative powers. For instance, he holds after the mixture of seeds, seminal matter forms a unity of its own because it possesses an essential form from which the vegetative powers required in the generation of a living being arise (Taurellus 1597,817). Already in *De procreatione hominis*, Taurellus denies that the temperament (and hence elementary heat) could be the bearer of generative power: “The seed certainly has its temperament; but this temperament does not have any generative power: Rightly so, for this power does not belong to the seed itself; therefore, the most potent forming power should not be ascribed to it; nor should it be ascribed to heat, be it inherent [in the seed] or coming from the outside” (§ 22).[[39]](#footnote-39) And he offers the hypothesis of seed forms as an alternative to the hypothesis of heat as the origin of vital powers: “We therefore maintain that the form of the seed, in so far as it is a seed, is the primary efficient cause of our generation; very much as the temperament of the seed, and heat, and spirit (in case it exists), and very much as the uterus are not primary causes but assisting causes” (§ 23).[[40]](#footnote-40)

From this perspective, Taurellus rejects three possible explanations for the similarity between parents and offspring. As he argues, the only argument for explaining the similarity with respect to species membership through the role of blood is the observation that the offspring of parents belonging to two different species is more similar to the mother; however, Taurellus objects:

But since this can happen due to some other cause, it is also evidently most absurd because species membership consists more in the spermatic body parts than in the sanguineous part: For the forming power … of blood does either not exist or is at least smaller than the one that resides in the seed. (§ 25)[[41]](#footnote-41)

Taurellus also rejects the explanation of similarity with respect to sex through differences with respect to temperament between the testicles on the right side and those on the left side:

Each genital vessel belongs to the same species and possesses the same power; after all, everyday experience shows that it is the same seed which has the same effect. Location does not allow us to make a distinction: For the mixed seed complements the total capacity of the uterus, such that it can be most conveniently fostered from each side. (§ 27)[[42]](#footnote-42)

Finally, Taurellus rejects the explanation of similarity with respect to external traits through the workings of the imagination:[[43]](#footnote-43)

We do not want to neglect the conception of the mind (which is called phantasy): everyone knows very well how great its power is. But it is not yet sufficiently understood what the proximate efficient cause of this kind [of effects] is, if you say that it is the phantasy; for through the understanding of the intellect or the mind nothing other happens than that there occurs an understanding of itself. And certainly, phantasy does not possess forces as strong as it appears to have. (§ 35)[[44]](#footnote-44)

In his critique of Cesalpino, Taurellus rejects the view that the male provides active force while the female provides nothing but passive matter (Taurellus 1597,811); he uses an anatomic argument from the existence of female testicles (Taurellus 1597,819) and argues that since both male and female seeds are infertile by themselves, both have to become more perfect through the interaction between their active powers (Taurellus 1597,819). Already in *De procreatione hominis*, Taurellus defends a medical two-seed theory of animal generation: “But that females are less perfect than males—this comment can in no way be tolerated. In its kind, each is absolute. And if there is some difference in perfection, this does not depend on the first origin but rather on the various accidents of both sexes, such as an otiose life-style from which perhaps the female sex becomes weaker” (§ 30).[[45]](#footnote-45) As he comments, “this weakness does not contribute anything to the generation of females” (§ 31).[[46]](#footnote-46)

This is why in his response to Cesalpino, Taurellus ascribes both to male and female seeds active powers that offer mutual assistance; he takes only the composite into which the seeds are fused to belong to the species and essence of the animal to be generated (Taurellus 1597,815). At the same time, Taurellus rejects the idea that the composite arising from the mixture of seed already contains preformed structures of body parts but rather holds that it contains structures that, through nutrition and other external influences, can be transmuted into body parts (Taurellus 1597,815). A parallel passage from *De procreatione hominis* gives a clue to the reason why Taurellus rejects preformationism:

Even if I see in the fetus most different parts: in the seed I do not see anything that has a relation to bones, body parts, and functional tissues. You may say that they all exist there although they are not perceived by our dull senses. This is the *diakrisis* of the atomists that Galen has often rejected. And certainly not without reason. For there would be no alteration and no generation, if everything remained always what it is. (§ 44)[[47]](#footnote-47)

Thus, if the hypothesis that the seed actually contains the rudiments of all body parts, then living beings would come about through the mere composition (*synkrisis*) of parts and they would decay through the mere separation (*diakrisis*) of parts—exactly what the so-called “syndiacritic hypothesis” that was gaining prominence in early seventeenth-century natural philosophy claimed.[[48]](#footnote-48) Preformationism is thus opposed to the claim that at a certain level of complexity composites could bring forth new causal powers. This is why Taurellus opts for the view that *none* of the structures of a living being are pre-formed in the seed: “We maintain that in the fetus there is nothing that was previously in the seed. For whatever is generated, did not exist before. And this splitting apart does not happen with the goal of generating bones. Because the seed consists of similar parts, everything can be generated out of the quality of a single part” (§ 45).[[49]](#footnote-49)

Consequently, Taurellus takes the determination of sex to be a matter of the interaction between the active powers of the male seed and the active powers of the female seed. As he conjectures, the dominance of the male seed leads to male offspring, that the dominance of the female seed leads to female offspring, and that equality of powers between male and female seeds leads to hermaphrodites (Taurellus 1597,815). He extends this pattern of explanation also to trait acquisition, without making the empirically implausible claim that the seed that is stronger in determining sex is also stronger in determining observable traits:

But perhaps someone may hold that, if the seed of the father wins such that a male is generated, it also wins such that the male generated by the father is similar to the father. This is an admirable process. The tiny seed has almost infinite powers. For there have to be as many powers as there are effects. Through the conjoined powers of both seeds it can happen that the one wins with respect to this or that power, and the other is overcome. (§ 34)[[50]](#footnote-50)

Taken together, these elements articulate a conception of animal generation according to which species membership, the determination of sex and trait acquisition are all explained through the differences between the structure of the constituent of mixtures and through the differences between the substantial forms emerging from different mixtures. These are exactly the differences for which Cesalpino’s conjecture of a universal divine principle of activity as the origin of life does not offer any explanation. And this is why Taurellus holds that an emergentist explanation of the origin of vegetative powers provides a biological argument in favor of the substantiality of living beings and their constituents that does not involve a hypothesis of a divine cause inherent in living beings.

**6 Conclusion**

What motivates Taurellus’s critique of Cesalpino’s account of the generation of living beings is thus his opposition to the theological implications that Cesalpino’s account brings with it. In particular, it is the connection between Cesalpino’s analysis of vegetative powers and his version of a theory of a unique active intellect that makes Taurellus’s critique an essential part of his own philosophical project. Contrary to Cesalpino’s view of a unique active intellect that animates all living beings, Taurellus develops an emergentist view according to which the substantial forms of parts of living beings, as well as the substantial forms of living beings have causal powers that go beyond the causal powers of elements and their temperament but at the same time depend for their existence on mixtures of elements. Elements, in turn, are understood as form-like, immaterial principles that, because they do not depend on any other created beings, are substances, not modes of a divine being. Substantial forms that emerge from the mixture of elements depend on composites but are not accidents because they are not composites themselves.

Emergentism, thus, is meant to defend the view that all natural beings act by means of their own natural powers. If so, then it is unnecessary to stipulate any divine principle of activity immanent in nature. Thereby, the degree of independence required by creation theory is upheld—natural beings depend for their existence on divine creation, but after the moment of creation, they act by means of their own powers alone. Taurellus’s considerations concerning elementary substantial forms and emergent substantial forms thus provide philosophical support to the view that, after creation, God does not interfere with the course of nature on a regular basis. Taurellus’s emergentist account of the origin of vegetative powers thus supports a version of substance pluralism that, in contrast to Cesalpino’s theory of the substantiality of living beings, is incompatible with substance monism. And if neither elements nor living beings can be thought of as modes of divine substance, only the doctrine of creation offers an explanation for their coming into being.

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1. Andreas Blank

   Department of Philosophy

   Alpen-Adria Universität Klagenfurt

   andreasblank@hotmail.com

   For an overview of Taurellus’s life and works, see Blank (2016). [↑](#footnote-ref-1)
2. I am aware of only a single, indirect reference in *Alpes Caesae* to this work: Taurellus says that he has discussed “elsewhere” the sense in which body and soul of humans could be understood to be immortal (Taurellus 1597,294); see below, section 4. [↑](#footnote-ref-2)
3. Stadtarchiv Nürnberg D 16 Nr. 573/1, fol. 38r-46v. Passages from this manuscript are reproduced below in section 5 with the kind permission from the Municipal Archive of Nuremberg. [↑](#footnote-ref-3)
4. See Marti (1994); Freedman (2005); Füssel (2016). [↑](#footnote-ref-4)
5. “Cesalpini de animabus humanis opinionem multo magis & absurdam, & impiam esse, quam fuerit Averrhois. Quod enim hic de intellectu assistente dixerat: hoc ad animas hominum, ceterorumque animalium, & ipsius adeo mundi totius transtulit Caesalpinus: unam asserens, per se esse animam pro corporum animatorum numero multiplicatam. Cuius scilicet participatione corpora sint animata, & substantiae.” [↑](#footnote-ref-5)
6. “Deus hic est Caesalpinianus: quem in tot discerpit particulas Caesalpinus: quot in hac rerum universitate putat esse substantias. Quo posito non tam Deus efficiens rerum caussa erit, quam constituens.” [↑](#footnote-ref-6)
7. All three claims are packed into the following passage (Cesalpino 1593, fol. 35v): “[P]rimum omnium principium substantia est, & sui ipsius intelligentia. Quatenus enim perfectissimum ens est, caeteris esse distribuit & perficit omnia: quatenus autem intellectio est, perfectionis desiderium rebus indit.” [↑](#footnote-ref-7)
8. “Natura igitur intellectus est, ut unus existens, simul sit multorum, per se tamen unius id est habitus, ut albedinis, nigridinis autem quatenus albedinis remotio. … Patet igitur ex dictis quo pacto unica intelligentia omnium rerum intelligentias contineat, est enim tanquam mensura omnium. Quemadmodum autem se habet intellectiones, sic etiam & res ipsas esse manifestum est: ab uno igitur multitudinem descendere non est impossibile. Patet etiam ex reductione entium ad unum, & ex modo quo substantiarum genera dicuntur secundum additionem & ablationem. … Quatenus igitur simpliciter est, & per ablationem omnis materiae dicitur, unica & simplex est substantia.” [↑](#footnote-ref-8)
9. On the doctrine of the eternity of species, see Hull (1965). On Cesalpino’s use of the doctrine, see Atran (1990), 138-142. [↑](#footnote-ref-9)
10. “Omnis igitur anima seu animae pars mortalium divinum ipsum participare videbitur …” [↑](#footnote-ref-10)
11. “alio modo quatenus ipsum esse diverso modo participant, ab uno quodam quae substantia est descendentia ….” [↑](#footnote-ref-11)
12. “[H]aec quamvis non secundum unum dicantur, ad unum tamen omnia sunt, scilicet ad eam substantiam, quae ut forma dicitur: ipius enim est ipsum quid est, & materia ideo substantia est, quia potentia est hoc, compositum autem quia actu id habet ….” [↑](#footnote-ref-12)
13. “[T]ria ista genera substantiarum esse inter se proportionabilia, omnia enim affectionibus quibusdam subiciuntur, & ubique substantia prior est & caeterorum causa. Ideo conveniunt in genere quodam analogo.” [↑](#footnote-ref-13)
14. “Quid hoc quaeso est aliud: quam Dei: rerumque ceterarum omnium substantias ita confundere; ut unaquaeque Deus ipse dicitur esse aliqua ex parte?” [↑](#footnote-ref-14)
15. “Si substantia dicatur id esse, quod per se subsistit: genus haec erit univocum. At inquies materiam non subsistere per se: neque formam: quas tamen ideo substantias esse oporteat: quod substantiae partes sint. Dicam quid mihi in mentem veniat. Miror an ulla sit vel substantia: vel substantiae pars … quae separata per se subsistere nequeat. Sed de hoc alias.” For detailed discussion of these matters, see Taurellus 2012, 274–280. [↑](#footnote-ref-15)
16. “Ita nobis occurrit: ut primam physicarum materiam non trina dimensione definiremus: quod ausus est Caesalpinus. Sed nihilum diceremus esse theologicum ….” [↑](#footnote-ref-16)
17. “materiam quae per se nihil est, per accidens aliquid esse velint: Hoc enim si verum sit, accidens erit non substantia …” [↑](#footnote-ref-17)
18. “Formas … naturales Physici sine subiecto subsistere non posse statuerunt, quod si concederetur non substantiae, sed accidentia forent, illae siquidem per se non in aliquo, vel ab aliquo, sed vi propria subsistant, haec vero non subsistere, sed inesse dicantur.” [↑](#footnote-ref-18)
19. “dic quaeso an per se natura vel in aliquo subsistat, quod si nihil ei subesse dixeris, cur non idem formae liceret adscribere, ut et natura sit ipsa, et per se sine materia subsistat.” [↑](#footnote-ref-19)
20. “Cum … mundus a Deo substantia separatus sit, ab aeterno ipsi nequaquam coniunctus fuit …” [↑](#footnote-ref-20)
21. “Cur non potius materiam? Formarum non est, ut subiiciant, sed materiae. Caliditas & frigiditas ad humidum accedunt, & ab eodem recedunt. Humiditatem figiditas informat; ut fiat aqua: Caliditas, ut fiat aer.” [↑](#footnote-ref-21)
22. “Activae qualitates, si formae sunt elementorum: accidentales certe sunt: non essentiales; quia separantur citra subiecti corruptionem.” [↑](#footnote-ref-22)
23. For detailed analysis, see Blank (2014). [↑](#footnote-ref-23)
24. “materia … nisi pro forma ignobiliori sumatur … nihil omnino componat.” [↑](#footnote-ref-24)
25. “Non enim forma ut forma, sed ut materia est, patitur.” [↑](#footnote-ref-25)
26. “materiam plane non existere, nilque praeter formas vel esse, vel componi posse …” [↑](#footnote-ref-26)
27. On Alexander and Galen, see Caston (1997); on Philoponus see Ganeri (2010); Sorabji (2010). [↑](#footnote-ref-27)
28. On Schegk’s natural philosophy, see Hirai (2007); Blank (2018). [↑](#footnote-ref-28)
29. “Cum … actione mutua, & passione res mixtae sic immutentur, ut earum nulla integra maneat, sed nova quaedam forma inde oriatur quae vires omnium referet, dubium non est quin compositae sint formae, quae multarum vires habent, differentesque proferunt effectus, quod in rerum mutationibus, tum maxime usu medicamentorum.” [↑](#footnote-ref-29)
30. “quia generatione unum quid revera fit, forma scilicet substantialis, non coniunctione aut alicuius accidentis respectu, simplex id quoque non compositum seu ab uno, seu sit a multis esse iudicamus.” [↑](#footnote-ref-30)
31. On the role of ontological dependence in the metaphysics of substance of Taurellus’s *Philosophiae Triumphus*, see Blank (2014). [↑](#footnote-ref-31)
32. “Elementa separata … actu non continent divinum hoc, sed potentia solum: in mixtione autem etiam actu: idcirco & actu sunt substantiae.” [↑](#footnote-ref-32)
33. On early modern alchemical interpretations of this passage, see Newman (2004), 200-206. [↑](#footnote-ref-33)
34. On this passage, see Solmsen (1957). For critical discussion, see Preus (1970), 35-38; Freudenthal (1999), 19-29, 40-46, 114-129; Lennox, (2001), 229-249. [↑](#footnote-ref-34)
35. “Aliud est semen: aliud item est semen foecundum. Ad animalis generationem non modo semen: sed etiam foecundum semen requiritur. Licet ergo Sol forte semen foecundum facere possit: qua de re merito dubitatur: semen tamen facere non potest.” [↑](#footnote-ref-35)
36. “Seminis calor non est per se foecundus. Nam si sit in luto, vel alia quapiam materia: nullam habet foecunditatis vim.” [↑](#footnote-ref-36)
37. “Non eamdem esse vim, & naturam seminalis caloris, & solaris. Si namque semen nativum suum calorem amittat; & a Sole tantum accipiat caloris, quantum ante fuit, non fiet tamen ita semen foecundum. Neque caliditas nativa satis est, ut semen foecundum efficiat. Si namque iusto sit semen calidius: vel temperate quidem sit calidum: sed humidius tamen: aut aliud habeat vitii quidpiam: infoecundum est. Quid ergo de solari calore dicamus: cum tot materiae conditiones ad foecunditatem requirantur. [↑](#footnote-ref-37)
38. “seminalis quaedam vis in putrescente materia insit: qualis in semine est perfecto: sed imperfectior. Non ergo solari calori primo: sed huic materiae tribuenda est ratio generationis animalium.” [↑](#footnote-ref-38)
39. “Semini suum equidem est temperamentum: cuius nulla nequit esse vis ad generationem. Huic tamen: cum semini proprie non competat: potentissima vis efformatrix attribui non debet: uti neque calori seu sit insitus, seu sit influens.” [↑](#footnote-ref-39)
40. “Eam ergo seminis formam qua semen est, primariam censmus esse causam nostrae procreationis effectricem: ut temperamentum eius, et calor, et spiritus (si quis modo est), quemadmodum et uterus causae sint non primariae, sed adiutrices.” [↑](#footnote-ref-40)
41. “Sed cum hoc alia de causa fieri possit: etiam ob id absurdissimum esse liquet: cum in partibus spermaticis potius, quam sanguineis consistat species: Cumque facultas efformatrix, vel … sanguinis nulla sit: aut saltem eâ modô minor, quam semen obtinet.” [↑](#footnote-ref-41)
42. “Utriusque vasis genitalis eadem est species, eademque facultas: Quin est idem quidem semen, et eiusdem eius effectum esse quotidiana testatur experientia. Nec ullum nobis hic situs discrimen admittitur: Semen namque concretum omnem totius uteri capacitatem complet: ut omni ex parte foveri possit commodissime.” [↑](#footnote-ref-42)
43. On early modern imagination theories of trait acquisition, see Smith (2006); Blank (2009). [↑](#footnote-ref-43)
44. “Nec animi conceptus (quem phantasiam vocant) negligi volumus: vis enim ei quanta sit, cuius cuivis est notissimum. Sed nondum tamen satis intelligitur, quanam sit huiusce generis effectivum causa proxima: si phantasiam esse dixeris: Cum nihil intellectu, vel animi compraehensione facit aliud: quam quod ipsius est intelligentiae. Nec certe convenit phantasiae tantae esse vires; quantas obtinere videtur.” [↑](#footnote-ref-44)
45. “Atqui vero faeminas esse maribus imperfectiores. Commentum hoc esse profitemur nullo pacto ferendum. In suo genere quidvis est absolutum. Et si quid sit in hac perfectione discriminis: id non a prima dependet origine: sed a variis utriusque sexus accidentibus: cuiusmodi est otiosum vita genus: quo ferè sexus muliebris evadit infirmior.” [↑](#footnote-ref-45)
46. “Non tamen haec infirmitas quicquam ad faemellarum generatione facit.” [↑](#footnote-ref-46)
47. “Equidem in faetu partes conspicor longe diversissimas: in semine nihil video, quod ossa: quod membras: quod parenchymata referat. Esse dicis haec omnia: licet sensibus obtusis non percipiantur. Haec Atomistarum est *diakrisis*: quam Galenus saepe reijcit: Et certè non immeritò. Nulla namque alteratio erit, nullaque generatio: si maneat idem perpetuo, quicquid est.” [↑](#footnote-ref-47)
48. For a detailed study of the development of this hypothesis, see Newman (2006). [↑](#footnote-ref-48)
49. “Nos in faetu nihil esse dicimus, quod antea fuerit in semine. Quicquid enim generatur, id ante non fuit. Nec ad ossium generationem illa fit secretio. Cum enim semen sit homoeomeres: ex qualitate unius partis quidvis potest procreari.” [↑](#footnote-ref-49)
50. “Sed existimaverit fortasse quispiam: si patris semen vincit: ut mas generatur: etiam vincere: ut mas hic a patre genitus patri sit similis. Mirandum hoc opus est. Semen exiguum vires habet propemodum infinitas: Tot enim oportet esse facultates: quot eius sunt effectus. His itaque seminis utriusque viribus coniunctis: fieri potest ut quod hac aut illa virtute vincet, alia superetur.” [↑](#footnote-ref-50)