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# Between Atoms and Forms: Natural Philosophy and Metaphysics in Kenelm Digby

HAN THOMAS ADRIAENSSEN AND SANDER DE BOER\*

**ABSTRACT** Kenelm Digby is now best remembered for his attempt at reconciling Aristotelianism with the new philosophies of his time. In his *Two Treatises* of 1644, Digby argued that, while the notion of form has no place in natural philosophy, it remains indispensable in metaphysics. This division of labor has not received much attention, but we argue that it played an important role in Digby's thought. The notion of form is central to his account of bodily identity over time, but by removing it from the domain of natural philosophy, he avoids some of the standard criticism of forms in authors like Descartes. In the final part of this paper, we turn to Digby's friend and follower, John Sergeant. We argue that, in Sergeant, we get an answer to the question of how the atomic parts out of which a body is built up relate to its form, which had remained open in Digby.

**KEYWORDS** Digby, Sergeant, substantial form, atomism, mechanism, metaphysics, Aristotelianism, Descartes

ALTHOUGH MOSTLY KNOWN TO specialists nowadays, Kenelm Digby (1603–1665) was a remarkable figure on the intellectual scene of the early seventeenth century. He has been described as “one of the most influential natural philosophers” of his time,<sup>1</sup> and corresponded with many of the great scholars of his days, including Descartes, and the French pioneer of atomism, Pierre Gassendi. In the later years of his life, Digby, alongside men like Robert Boyle, became one of the founding members of the Royal Society.<sup>2</sup>

Digby authored one major work of philosophy: the *Two Treatises* of 1644. This work consisted of a long First Treatise on bodies, and a shorter, Second Treatise on the human soul. In the First Treatise, Digby argued that all bodies are built up out of minute bits of matter he called ‘atoms’ and claimed that it is the composition of their atomic parts that gives bodies their physical characteristics. With this claim,

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<sup>1</sup>Antonio Clericuzio, *Elements, Principles and Corpuscles*, 81.

<sup>2</sup>On Digby's life and work, see Michael Foster, “Digby, Sir Kenelm.”

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it has been argued, Digby was the first to offer a full statement of an atomic system in the English language.<sup>3</sup>

But at the same time, Digby combined his atomism with a clear commitment to the philosophy of Aristotle.<sup>4</sup> Indeed, the atoms out of which the material world is composed, in his view, are but minute portions of the four Aristotelian elements. And more significantly still, bodies for him were not just composites of atoms, but also compounds of matter and form. Indeed, Digby balanced these two views of what bodies are by employing what appears to be a division of labor between natural philosophy and metaphysics. In natural philosophy, he claimed, we should treat of bodies as mere atomic compounds, and the notion of form has no place in this domain. In the domain of metaphysics, however, we cannot do without it. There, form is indispensable as a way to deal with questions concerning material substances that cannot be answered merely by appealing to their atomic composition.

This division of labor in Digby has been little studied, but in this paper, we argue that it plays an important role in his philosophy. In particular, we show that by retaining the notion of form in the domain of metaphysics, Digby thinks he can account for bodily identity over time in general, and for the resurrection of the human body in particular. But by removing it from the domain of natural philosophy, he can offer intelligible accounts of natural processes such as calcination, and of the physical characteristics of metals and other materials.

Yet his treatment of form also raises questions. In particular, it raises the question of how the form of a body relates to the atoms out of which the body is built up. In other words, it raises the question of just how his two accounts of what bodies are, one atomic and one formal, fit together. Unfortunately, this is a question that Digby himself never addressed. We argue, however, that in one of his most important followers, John Sergeant, we are given a suggestion as to how bodies can be, at the same time, atomic composites as well as the bearers of forms.<sup>5</sup> Today, Sergeant is mostly known as a vehement critic of the Cartesian way of ideas.<sup>6</sup> Nonetheless, he recognized that Descartes and his followers raised legitimate challenges for the scholastic concept of form. In his attempt to accommodate this criticism without simply rejecting forms, he built on the natural philosophy of the First Treatise, and in doing so suggested a way in which bodies can both be atomic composites, and the bearers of forms that identify them.

We proceed as follows. In section 1, we look at Digby's account of the four elements. This account draws on Aristotelian traditions in a number of ways, but as section 2 will make clear, he parted ways with this tradition when he denied to

<sup>3</sup>On Digby's contribution to atomism in England, see Robert Kargon, *Atomism in England*, 66–67; and Clericuzio, *Elements, Principles and Corpuscles*, 81–86.

<sup>4</sup>Christia Mercer describes Digby as a “reformed philosopher,” who aimed to reconcile Aristotelianism with the new philosophies of the seventeenth century (*Leibniz's Metaphysics*, 106–7).

<sup>5</sup>The most extensive study of the relationship between Digby and Sergeant remains Dorothea Krook, *John Sergeant*. Both were members of the Blackloist faction of English Catholicism. On Blackloism, see John Henry, “Atomism and Eschatology.” See also Beverley Southgate, *Covetous of Truth*, 34–41; and Stefania Tutino, *Thomas White and the Blackloists*.

<sup>6</sup>See, e.g. Richard Glauser, “John Sergeant's Argument against Descartes”; and, more recently, Han Thomas Adriaenssen, *Representation and Scepticism*, ch. 6.

the notion of form a place in the domain of natural philosophy. In section 3, we explain the role Digby assigned to forms in his metaphysics of identity. In section 4, we argue that, while Digby's division of labor allowed him to avoid some of the standard criticism of forms by thinkers such as Descartes, his ontology of the material world also gave rise to the question of just how the form of a body relates to its atomic composition. In section 5, we claim that, while Digby himself does not appear to address this question, the work of his friend and follower Sergeant provides a suggestion here.

#### I . ELEMENTS

In a 1637 letter to Hobbes, Digby wrote that the sciences ought to build, not on the "deep insights" of the learned few, but on the "generall notions and apprehensions that all men, the vulgar as well as the learned, frame of all things that occurred unto them."<sup>7</sup> In his letter, Digby did not specify which notions he took these to be. But seven years later, in the opening chapter of his *First Treatise*, he made it clear that for the science of bodies the basic framework of general notions was provided by the ten Aristotelian categories. Bodies are substances bearing accidents of various sorts, and it is in this way that all, the learned and the vulgar alike, think of the bodies they encounter:

For when any obiect occurreth to our thoughts, we eyther consider the essentiall and fundamentall Being of it; or we referre it to some species of Quantity; or we discover some qualities in it; or we perceive that it doeth, or that it suffereth some thing. . . . Of all which, every man living that enioyeth but the use of reason, findeth naturally within himselfe at the very first naming of them, a plaine, complete, and satisfying notion.<sup>8</sup>

Among the accidents that we ascribe to material substances, quantity takes a special place. This is so because quantity, for Digby, just is extension, and as such it is an accident that all and only material substances have.<sup>9</sup> That is, all material substances are extended in space, and this sets them apart from immaterial substances like our souls.

But even if extension is special in this way, Digby does not believe that material substances reduce to their extension. On the contrary, he believes that there is an "absolute distinction" between a material substance and its extension, and claims that the extension of a substance is something "besides" the substance itself.<sup>10</sup> That is, even though all and only material substances are extended, they are not extended in and of themselves. Instead, they are extended in virtue of an accident that somehow is a being over and above the substances it causes to be extended.<sup>11</sup>

Digby draws on this distinction between material substance and quantity to give an account of the rarity and density of bodies. In his view, bodies behave a bit like

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<sup>7</sup>Digby to Hobbes, January 17, 1637 (Hobbes, *The Correspondence*, 1:42). References to the correspondence are given according to volume and page number in Malcolm's edition.

<sup>8</sup>*Two Treatises*, 5.

<sup>9</sup>*Two Treatises*, 1 and 9.

<sup>10</sup>*Two Treatises*, 25 and 22.

<sup>11</sup>On Digby on the ontological status of quantity, see also Robert Pasnau, *Metaphysical Themes*, 286–87.

elastic bands that, as they stretch out, gain extension in that they come to occupy more points in space than before. A high degree of stretch, on this account, is what makes a body rare. A low degree of stretch, or a state in which a body has but a moderate extension and occupies relatively few points in space, by contrast, is what makes it dense.<sup>12</sup> Digby tries to capture this idea when he defines the rarity or density of a body as the ratio between its substance and its quantity as follows:

The essence of Rarity and Density, standeth in the proportion of quantity to substance.<sup>13</sup>

Without further context, this definition may look a bit puzzling. After all, proportions obtain between quantities, but if a bodily substance and its quantity are indeed absolutely distinct, as Digby has claimed, we would here seem to have a proportion obtaining between, on the one hand, unquantified bodily substance, and on the other hand, a measure of the amount of space occupied by that substance.

But at this point, it is helpful to realize that, with his account of rarity and density, Digby was likely drawing on a scholastic tradition of natural philosophy. For among the Aristotelian scholastics, it was not uncommon to claim that bodies have a certain mass independently of the amount of space they occupied.<sup>14</sup> This mass could take up either a small or a large amount of space and, as a result, in each body there would be two magnitudes: its mass and the amount of space it occupied. The ratio between these two magnitudes would then determine how rare or dense a body was.<sup>15</sup> Or as the influential Jesuit philosopher and theologian, Francisco of Toledo, put it in his *Physics* commentary:

That is called rare, which contains little matter under a large quantity. Conversely, that is called dense, which contains a lot of matter under a small quantity.<sup>16</sup>

It seems likely that Digby has in mind a similar picture when he defines rarity and density as the proportion between a substance and its quantity. It seems likely, that is, that for Digby substances have a certain amount of mass independently of the amount of space they occupy, and that it is the ratio between these two that determines the rarity or density of a body.<sup>17</sup>

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<sup>12</sup>Digby's account is notably different from Descartes's. As Descartes argues in the *Principles*, a body that rarefies does not gain extension, but occupies the same number of spatial points as before. All that happens is that tiny pores open up between its parts, making it less compact. Digby disagrees with accounts that make rarity and density a function of porosity. Liquids are generally rarer than solids, he argues, yet there is no evidence that they have the inner structure of "nettes or cobbewebbes" (*Two Treatises*, 21). For Descartes, see AT VII.42–43/CSM I.225. All references to Descartes are according to volume and page number in the Adam and Tannery edition of the *Oeuvres*, followed by volume and page number in the English translation of the *Philosophical Writings*.

<sup>13</sup>*Two Treatises*, 24.

<sup>14</sup>For discussion, see Dennis Des Chene, *Physiologia*, 107–9; and Pasnau, *Metaphysical Themes*, 301–8.

<sup>15</sup>These two magnitudes would sometimes be referred to as *quantitas molis* and *quantitas extensionis*. See Des Chene, *Physiologia*, 107 and 351.

<sup>16</sup>"Rarum autem dicitur id, quod parum materiae sub multa continet quantitate: e contra, densum, quod sub parva quantitate multum continet materiae" (Toledo, *In libros Physicorum*, Book 4, chapter 9, question 11. In *Opera omnia philosophica*, 4:132). References to the *Opera omnia philosophica* are according to volume and page number. Unless otherwise indicated, all translations are ours.

<sup>17</sup>Thomas White seems to have understood Digby in this way. Thus, in his summary of the First Treatise, Thomas White has rarity and density "springing from the proportion of Matter to this Quantity" (*Peripatetical Institutions*, 204).

Having thus defined rarity and density, Digby goes on to use these notions to further develop his ontology of the material world. Like Aristotle, Digby thinks the world is built up out of four elements, and that each of these elements is characterized by two elementary qualities, as follows:

Water	wet and cold
Earth	dry and cold
Air	wet and hot
Fire	dry and hot

In *Physics* VIII, however, Aristotle had remarked that “all affections have their origin in condensation and rarefaction.”<sup>18</sup> And according to Digby, this meant that the elementary qualities of wet and dry and cold and hot must be rooted in rarity and density.

Take, for instance, the cases of water and earth. According to Digby, both water and earth are relatively dense, and this is what makes them cold. In general, indeed, “heat is a property of rare bodies, and cold of dense ones.”<sup>19</sup> Wet and dry, too, are the result of rarity and density. More precisely, they are the result of the ratio between the rarity or density of a body, on the one hand, and its weight, on the other.<sup>20</sup>

To see how this works, consider a body that is both dense and heavy. Because it is dense, it is compact, and its parts resist easy division. But because it is heavy, its parts are also subject to a certain downwards pull. Hence, if the body is heavier than it is dense, its parts will be severed and begin to trickle down. That is, if the body is heavier than it is dense, it will “become fluide and moist.”<sup>21</sup> This, according to Digby, is the case with water.<sup>22</sup>

By contrast, if the density and weight of a body are in balance, its parts will continue to stick together, and the body will remain dry. And this, Digby thinks, is what happens in the case of earth. That earth is cold and dry for him thus comes out as the result of two ratios. First, there is the ratio between the substance and the quantity of earth, which makes it dense and cold. And second, there is the ratio between its density and its weight, which makes it dry.<sup>23</sup>

## 2 . F O R M S

The groundwork of Digby’s ontology of the material world, then, is molded by Aristotelian tradition in a number of ways. It takes its point of departure in the ten Aristotelian categories, and uses them to arrive at an account of rarity and density that bears the traces of a scholastic tradition of natural philosophy. And this account, in its turn, gets used to arrive at an analysis of the qualities that

<sup>18</sup>*Physics* 260b7–8. All Aristotle translations are taken from the Barnes edition of the *Complete Works*.

<sup>19</sup>*Two Treatises*, 28.

<sup>20</sup>Digby also speaks of gravity. On gravity in Digby, see Kurd Lasswitz, *Geschichte der Atomistik*, 2:196–97; and Tutino, *Thomas White and the Blackloists*, 23–24.

<sup>21</sup>For a more detailed discussion, see also Daniel Garber, “New Doctrines of Body,” 567–68.

<sup>22</sup>*Two Treatises*, 28.

<sup>23</sup>Air and fire receive similar analyses. For discussion, see Lasswitz, *Geschichte der Atomistik*, 2:193–94.

characterize the four elements that Aristotle had marked out as the building blocks of material reality.

At the same time, however, it is clear that, in other respects, Digby departs from this tradition. According to a standard scholastic view, the qualities of the elements were rooted in their substantial forms.<sup>24</sup> Water, in this view, had a form that made it wet and cold. Thus, according to Duns Scotus, these qualities “inseparably follow from the elementary forms.”<sup>25</sup> And according to Francisco Suárez, the form of water serves as an inner source from which cold, as it were, “flows” (*manat*).<sup>26</sup> Indeed, it is this inner source of cold that causes hot water to cool down again when left to its own devices.

But Digby never says that the qualities of water flow from a form, or that it has a form that sustains the rarity and density that makes it cold and wet. Indeed, he thinks it would be wrong to do so. For the notion of form just does not belong to the domain of natural philosophy:

Were it our turne, to declare and teach Logike and Metaphisikes, we should be forced to goe the way of *matter*, and of *form*, and of *privations*. . . . But this is not our taske for the present; for no man that contemplateth nature as he aught, can choose but see that these notions are no more necessary, when we consider the framing of the elements, then when we examine the making of compounded bodies.<sup>27</sup>

In the remainder of this section, we will explore in some detail how Digby proceeds without forms in the natural philosophy of composite bodies by taking a brief look at his accounts of mixture and animal generation. In the next section, we will turn to the positive claim here that forms still have a role to play in metaphysics.

### 2.1. *Mixtures*

In *On Generation and Corruption*, Aristotle argues that mixtures are built up out of the four elements. But, at the same time, a truly mixed material, for Aristotle, is more than a mere composition of elementary particles. For a truly mixed material is uniform, in the sense that each of its constituent parts is of the same nature, “just as any part of water is water.”<sup>28</sup> But a mere composition of elements will never be uniform in this sense. Any composition of elements, uniform as it may seem to most of us, to the microscopic eyes of Lynceus will always be but a texture of two or more materials.<sup>29</sup>

The details of Aristotle’s account of mixture are not easy to pin down, and later Aristotelians developed various models of the blending of elements into a mixed material. One of these was the model put forth by Thomas Aquinas in the thirteenth century. On this model, when the elements combine in the right

<sup>24</sup>Throughout this paper, we will often simply use ‘form’ to refer to the substantial form of a body.

<sup>25</sup>“videntur consequi inseparabiliter formas elementares” (Scotus, *Quaestiones super praedicamenta Aristotelis*, question 40. In *Scoti Opera*, 1:537). References to Scotus’s works are according to volume and page in the *Scoti Opera*.

<sup>26</sup>Suárez, *Disputationes metaphysicae*, Disputation 15, section 1, paragraph 8. In *Suarez Opera*, 25:500. References to Suárez’s *Disputationes* are by volume and page number in the Vivès edition. On Suárez on substantial form, see also Helen Hattab, *Descartes on Forms and Mechanisms*, 45–48.

<sup>27</sup>*Two Treatises*, 344.

<sup>28</sup>Aristotle, *On Generation and Corruption*, 328a11.

<sup>29</sup>Aristotle, *On Generation and Corruption*, 328a15.



proportion, a new form arises. This new form replaces the forms of the elements and imposes the nature of a new material upon them.<sup>30</sup> On this model, then, the forms of the elements disappear in the blend. Other models, however, had the elements survive the process of mixture in some way. Thus, according to Averroes in the twelfth century, mixture results when the forms of the elements go into a kind of remission, which allows them to blend into a combined form. On this model, the original forms of the elements do not completely disappear in the mixture, but survive in the new, combined form. In the late sixteenth century, a version of this account was put forth by, among others, the Paduan philosopher, Jacob Zabarella.<sup>31</sup>

On a third model, going back to the Persian doctor Avicenna in the eleventh century, it is the qualities of the elements, not their forms, that go into remission. This allows them to blend into a new quality, which is evenly spread out over, and is characteristic of, the mixed material. With the emergence of this quality, a new form is also introduced in the material. This new form does not replace the forms of the elements, which remain fully intact, but rather dominates them so as to direct their powers to the conservation of the mixture and its physical characteristics.<sup>32</sup> As the French medical scholar, Jean Fernel, put it in his *Physiologia*, in a mixed material,

small portions of the elements remain, and are intact with their forms. But they are not free, or in their own right, but entangled, bound, and as it were curbed . . . by the presence of a more worthy form.<sup>33</sup>

In his First Treatise, Digby starts from *On Generation and Corruption* to formulate his own account of mixture.<sup>34</sup> Like Aristotle, Digby there claims that mixed materials result from combinations of two or more elements. More precisely, he believes that mixtures result from the combination of atomic portions of the elements:

Lett any man reade his books of Generation and Corruption, and say whether he doth not expressly teach, that mixtion, which he delivereth to be the generation or making of a mixt body, is done *per minima*, that is in our language and in one word, by atomes.<sup>35</sup>

An atom, in Digby's vocabulary, is a minute portion of one of the elements that, though not indivisible in principle, does resist further division in practice. It is the mingling of elementary minima of this kind, he claims, that yields the mixed materials we find around us.<sup>36</sup>

<sup>30</sup>For a more detailed discussion, see Anneliese Maier, 'Die Struktur der Materiellen Substanz,' 31–35.

<sup>31</sup>On Averroes and Zabarella on mixture, see William Newman, *Atoms and Alchemy*, 108–11.

<sup>32</sup>For a detailed account of Avicenna on mixture, see Abraham Stone, "Avicenna's Theory of Primary Mixture."

<sup>33</sup>"Quae porro in hoc genito simplici corpore manent exiguae elementorum portiones, suis quidem formis integrae subsistunt, non tamen liberae aut sui iuris, sed implicitae, vinctae, et quasi interceptae . . . dignioris formae praesentia" (Jean Fernel, *Physiologia*, 212).

<sup>34</sup>On Digby on mixture, see also the detailed account in Andreas Blank, "Composite Substance," 7–14.

<sup>35</sup>*Two Treatises*, 343. On Digby's atomistic interpretation of Aristotle here, see Henry, "Kenelm Digby," 51–53.

<sup>36</sup>On this use of 'atom,' see *Two Treatises*, 38. Digby was criticized for his combination of Aristotelianism and atomism here. Thus, the conservative Aristotelian, Alexander Ross, urged him to "father not these your atoms upon Aristotle" (*Philosophical Touchstone*, 60).

As Digby goes on to flesh out his understanding of mixture, it becomes clear that it differs from the models encountered above in a number of ways. First, according to Digby, a body that is built up from atomic portions of the four elements will have to be “composed of heterogeneous partes.”<sup>37</sup> It is clear from the outset, then, that in spite of the reference to *On Generation and Corruption* in the presentation of his account of mixture, Digby does not share with Aristotle the view that mixtures are homogeneous and uniform substances.

Second, Digby claims that the atomic portions of the elements that go into a mixture all “remain pure,” and that earth, water, fire, and air are in a mixture “in their own Essences.”<sup>38</sup> This clearly sets him apart from the first two models above, where the natures of the elements either disappear in the mixture or go into remission. Third, if his claim that the elements remain pure in a mixture may seem to put Digby in at least a partial agreement with the third model above, at the same time he rejects the way in which that model draws on the Aristotelian notion of form. The metaphysical notion of form, according to Digby, is not helpful in a natural philosophical discussion of mixture. Having made the point that the elements remain pure in a mixture, Digby writes:

Which position we do not understand so Metaphysically as to say that their substantial forms remaine actually in the mixed body; but onely that their accidentall qualities are found in the compound; remitting that other question unto Metaphysicians (those spirituall anatomistes) to decide.<sup>39</sup>

Finally, the proponents of the models we have seen so far typically hold that the form of a mixed body is the inner source of its physical properties. According to the influential Thomist, John Poinset, for example, these properties “follow” from the form:

Because the form of the mixture is one, some one quality will also be able to emerge, like an active power, as in the magnet that attracts iron, or a color that is proper to the mixture itself, or some other quality like this. But these qualities follow the form of the mixture.<sup>40</sup>

But on Digby’s account, the physical properties of mixed materials are the result of their specific composition of elements, not form. Consider, for example, the case of metals. According to Digby, in the typical texture of metals, all of the four elements occur in a certain proportion, in such a way that water serves as the atomic glue that makes their dry parts stick together. This alternation between wet and dry parts in the atomic texture of metals helps us to understand, among many other things, physical processes such as calcination, where a dry powder is obtained from a metal by the application of an intense heat to it. Indeed, on

<sup>37</sup> *Two Treatises*, 143. See also *Two Treatises*, 129.

<sup>38</sup> *Two Treatises*, 143.

<sup>39</sup> *Two Treatises*, 143.

<sup>40</sup> “quia tamen forma mixti est una, poterit etiam sortiri aliquam qualitatem, quae una sit, v.g. aliquam virtutem activam, sicut magnes attrahit ferrum, vel aliquem colorem proprium ipsius mixti, aut aliquid simile: sed istae qualitates consequuntur formam mixti” (Poinset, *Philosophia naturalis*, Part 2, question 6, article 3. In *Cursus philosophicus Thomisticus*, 646). The first edition of the *Cursus philosophicus* appeared between 1631 and 1635.

Digby's account, calcination results when the atomic glue between the dry parts of a metal dries up itself, causing the metal to decompose into dry grains of matter.<sup>41</sup>

But the alternation of wet and dry parts in the atomic texture also helps us to understand some of the more obvious properties of metals. Thus, according to Digby, the alternation of wet and dry parts in a given atomic composition will yield a material that is soft and pliable, and so it is this kind of alternation in the make-up of metals that is the best explanation of their typical malleability:

their ductility and malleability plainly telleth us, that the smallest of waters grosse partes, are the glew that holdeth the earthy dense ones together.<sup>42</sup>

But if, in these cases, the atomic structure of materials can account for their physical properties and behavior, for Digby they are but illustrations of a point that is much more general. For towards the end of the First Treatise, we are told that "all the nature of bodies, their qualities, and their operations, are compassed by the mingling of atomes."<sup>43</sup> In Digby's account of mixed materials, then, all their physical characteristics spring from the particular composition of elementary minima.<sup>44</sup> Forms play no role in this account.

## 2.2. *Organisms*

Organic bodies are perhaps the most complex kind of bodies there are. According to Digby, indeed, the bodies of animals behave like highly complex machines, each part of which is put in motion by some other part in such a way that the motion of all parts, each in their own way, contributes to the functional unity of the whole.<sup>45</sup> But how do complex bodies of this kind originate?

To develop his own view, Digby first sketches an alternative account of animal generation. On this account, animals are preformed in their parents' seed. In particular, it holds that minute bits of matter flow from all of the parents' limbs to their genital parts, where they are collected in a seed that "containeth formally every part of the parent."<sup>46</sup> When Digby wrote his *Two Treatises*, versions of this originally Hippocratic theory of generation had recently been put forward by scholars such as the Paduan doctor Emilio Parisano, and it has been suggested that it may have been their ideas that Digby was engaging here.<sup>47</sup> According to Parisano,

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<sup>41</sup> *Two Treatises*, 125. The thirteenth-century alchemist known as Geber had similarly described calcination as the drying up of the interparticular glue holding together the various materials out of which metals are built up (*Summa perfectionis*, 417). Digby describes Geber as the "Master" of the alchemists (*Two Treatises*, 344), and it seems likely that he would have taken his account of calcination and interparticular glue here from him. On Digby and Geber, see also briefly Newman, "Experimental Corpuscular Theory," 305–6. On Digby's alchemical work, see Betty Jo Dobbs, "Studies."

<sup>42</sup> *Two Treatises*, 125. For discussion, see also Clericuzio, *Elements, Principles and Corpuscles*, 81–82.

<sup>43</sup> *Two Treatises*, 343.

<sup>44</sup> Digby also says that they arise from the degree of rarity or density of the mixture (*Two Treatises*, 126). But as this degree of rarity or density is at its turn a function of the way the various elements are combined in a given mixture, these claims are two sides of the same coin.

<sup>45</sup> *Two Treatises*, 208. Digby compares the organization of animal bodies to that of the royal mint of Segovia, which he describes as a series of smaller machines, each of which is put in motion by another, and which all contribute to the production of a minted coin as their joint end product.

<sup>46</sup> *Two Treatises*, 213.

<sup>47</sup> E.g. Peter Bowler, "Preformation and Pre-existence," 228–39.

“hidden channels” in the body transport materials from all limbs to the genital parts, where the “seminal parts that are so collected will form a little animal.”<sup>48</sup>

Similar ideas were later put forth by Gassendi, who at one point in his *Syntagma philosophiae Epicuri* offered the following account of the formation of animal seeds:<sup>49</sup>

And then, as the seminal Atoms that had flown down from the individual limbs . . . were drawn to similar ones and combined with them, those atoms that were in the head were received in one region, those that were in the breast in the next, and those that came from other parts in individual regions of their own. And thus a little Animal was then formed, which was similar to the one from which the seeds came down.<sup>50</sup>

To be sure, Gassendi’s *Syntagma* first appeared in 1649, five years after the *Two Treatises*. As an active member of the Mersenne circle of scholars, however, Digby may well have learned about Gassendi’s ideas here before they were published.<sup>51</sup>

But Digby rejects this account. Echoing a standard line of criticism against it,<sup>52</sup> he claims that, for all we know, organic bodies just do not have enough channels to transport atoms from even their minutest parts. He then goes on to discuss a more refined version of the theory. On this version, it is not the case that material flows down from all individual parts of the body, but merely that specimen of all the different kinds of materials out of which the body is built up flow down and are collected in the seed. On this refined account, the seed remains a receptacle of minute portions of fiber and flesh but need not receive material from all individual fibers and members of the body from which it originated.

As Digby understands it, such an account will heavily rely on a formal principle to organize the materials collected in the seed into an organic structure. In particular, it will have to rely on a “formative power” to serve as an active principle that organizes these materials into a miniature version of the future animal. But Digby is not happy with the concept of such a “cunning artificer” in the seed.<sup>53</sup> First, because he thinks the development of an organic structure from a mere seed is a far too complex process to be the work of a single agent like the formative power. And second, because he feels that ‘formative power’ is but a word where an explanation would have been needed. As such, the notion does nothing to advance our understanding of the generation of complex organic structures.<sup>54</sup>

On Digby’s own account, animal seeds are residual products of the circulation of the blood.<sup>55</sup> As blood passes through an organ, it assimilates the temperature

<sup>48</sup>Minute parts of matter are transported “per secretos corporis cuniculos,” and the “sic coniunctae seminales partes parvum erunt animal” (Parisano, *Nobilium exercitationum*, 118).

<sup>49</sup>For a more detailed account of Gassendi on animal seeds, see François Duchesneau, *Modèles du vivant*, 85–118.

<sup>50</sup>“Tum, ut Atomi . . . quae ex singulis defluxissent partibus . . . cum similes traherentur, confluerentque ad simileis, ideo, quae forent in capite, in unam regionem se reciperent; quae ex thorace in consequentem, et quae ex aliis partibus singulis in singulas suas: sicque Animalculum tandem formaretur illi simile, ex quo semina decidissent” (Gassendi, *Syntagma*, 350–51).

<sup>51</sup>We know that, in the First Treatise, Digby discusses an experiment by “that learned and ingenious man Petrus Gassendus” purported to show the existence of small vacuities in the atomic structure of water that would not appear in print until later (*Two Treatises*, 154). For discussion, see Clericuzio, *Elements and Corpuscles*, 84.

<sup>52</sup>Parisano himself, e.g. raises and answers this objection in *Nobilium exercitationum*, 110.

<sup>53</sup>*Two Treatises*, 215.

<sup>54</sup>*Discourse*, 47.

<sup>55</sup>For a more detailed discussion of Digby’s own account, see Blank, “Composite Substance,” 11–14.

and degree of rarity or density of that organ. This allows the organ to draw new material for growth from the blood, and a large portion of the blood is indeed used in this way. A small residue, however, is not, and this residue gets collected in the genital parts. There, it serves as material for a seed that is built up from residual portions of blood coming from all the bodily parts it nourishes.

This seed will eventually develop into an organism. But Digby does not believe that this development is guided by some kind of formal power in the seed. In his view, rather, the development of the seed is the result of “outward agents,” like the heat and motion of the maternal womb, that, as they act upon the seed, “do change it into an other substance.”<sup>56</sup> Indeed, the action of these agents changes the seed into an embryo that, in a gradual chain of further changes, eventually becomes a fully developed organism.

When the seed becomes a new substance in this way, Digby speaks of a “substantial mutation.”<sup>57</sup> Now, in the Aristotelian tradition, a substantial change was taken to be a process in which the form of a body was replaced with a new one. But when Digby describes the substantial change of a seed into an embryo, he avoids all reference to form. What he does say, instead, is that the heat and motion of the outward agents that act upon it cause the seed to swell, and that the pressure of these agents causes some of its parts to harden while others remain soft. It is this sort of change in the constitution of the seed, Digby thinks, that makes it become a new kind of substance.<sup>58</sup>

To be sure, many of the details of this process are left open. But what seems clear at this point is that, even as he treats of organic bodies, Digby proceeds without the notion of form as much as he can. He thinks of animals as devices whose motion is the result of the mechanical interplay of their material parts, and formal powers play no role in his account of animal generation. But even if, as we have seen, he thinks that the notion of form does not belong in the domain of natural philosophy, at the same time he holds that, in metaphysics, we cannot do without it. In the next section, we explore just what kind of role Digby sees for form in this domain.

### 3 . FORMS AND IDENTITY

In a recent paper, Andreas Blank has argued that one of the things that Digby wants form to do in metaphysics is serve as a principle of substantial union. On this reading, form, for Digby, is a principle that unifies the parts of material substances so as to set them apart from accidental combinations of particles, or mere heaps of matter.<sup>59</sup> And this is a plausible reading. Indeed, historically, one of the main functions of forms had been to unify substances into wholes that are more than just heaps of matter.<sup>60</sup> But, as we will argue in this section, Digby also sees another role for forms. To see what this role is, we need to move beyond the *Two Treatises*, and turn to two of Digby’s less familiar works.

<sup>56</sup>*Two Treatises*, 219. For a brief description of this process, see Wolfram Schmidgen, *Exquisite Mixture*, 38–39.

<sup>57</sup>*Two Treatises*, 217.

<sup>58</sup>*Two Treatises*, 217.

<sup>59</sup>Blank, “Composite Substance.”

<sup>60</sup>See Pasnau, *Metaphysical Themes*, 555–57.

The first of these is Digby's *Observations* on Thomas Browne's *Religio medici*. In this short book, which soon gained a large readership throughout Europe after it first appeared in 1642, Browne offers a plea for religious toleration, and seeks to mark out a domain for religion that is not confined by the boundaries of human reason.<sup>61</sup> To have faith, Brown argues, is to be willing to believe more than just what reason can see into, such as that God created the world out of nothing, or that our bodies shall rise again at the last judgment.

This second dogma, according to Browne, is particularly hard for human reason to fathom. As our dead bodies reduce to ashes and dust, after all, wind and nature will scatter their parts over the earth, where some will serve as food to other animals or mix with other materials to become the building stones of new inanimate bodies. And this makes it hard to see how the same bodies that once died could ever rise again. And yet, Browne writes, as Christians we must trust that God can do what reason cannot grasp, and that at the end of time, soul and body will be united again:

I beleeeve that our estranged and divided ashes shall unite againe, that our separated dust after so many transformations into the parts of Minerals, Plants, Animals, Elements, shall at the voice of God returne into their primitive shapes.<sup>62</sup>

At the end of time, at the command of God, our ashes will combine again to form a "glorious body" that is truly identical with the body our souls once departed from.

Digby read Browne's account, and found it flawed. Browne's whole discussion is premised upon the idea that, for the glorious body and the body that once died to count as the same identical body, all of their material parts need to be the same. But that, according to Digby, does not sit well with how we normally think of human bodily identity. For surely, he writes in a brief address to Browne, "that body of yours, that is now growne to such comely and full dimensions," is "the same body, which your virtuous and excellent Mother bore nine months in her chast and honoured wombe, and that your Nurse gave sucke unto."<sup>63</sup> But at the same time, "sublunary matter being in a perpetuall flux,"<sup>64</sup> it is just as clear that there will be but very little, if any, overlap in material parts between the body of Browne the new-born child and Browne the mature man.

For a body at two moments of time to count as the same body, then, sameness of material parts cannot be necessary. If it were, no body would survive even the smallest change on the level of its material parts. According to Digby, what is necessary, as well as sufficient, for bodily identity over time, is sameness of substantial form:<sup>65</sup>

Let us consider then how that which giveth the numerical individuations to a *Body*, is the substantial forme. As long as that remaineth the same, though the matter be in a continuall fluxe and motion, yet the thing is still the same.<sup>66</sup>

<sup>61</sup>On *Religio medici*, see Claire Preston, *Thomas Browne*, 42–81.

<sup>62</sup>Browne, *Religio Medici*, 89.

<sup>63</sup>*Observations*, 82.

<sup>64</sup>*Observations*, 83.

<sup>65</sup>See also Udo Thiel, *Early Modern Subject*, 41.

<sup>66</sup>*Observations*, 82. Even for Digby, then, it is possible to think of substantial change as a kind of formal change. It is possible for him to say, that is, that one body changes into another as it loses the

Our body, then, remains the same individual substance as long as it retains its substantial form. This form, which Digby identifies with our soul, is the “distinguisher and individuator” of the matter of our body.<sup>67</sup>

Having established this, Digby goes on to apply his analysis to the resurrection of the body. For the same body that died to rise again, it is not necessary that all its individual atoms and ashes “should at the sounding of the last Trumpet be raked together againe from all the corners of the earth.”<sup>68</sup> Rather, for my body to rise again, it suffices that some portion of matter join with the same substantial form that used to inform my living body.

In the later *Discourse on the Vegetation of Plants*, Digby generalizes this formal account of identity over time. Harking back to a view he had first put forth in the First Treatise, Digby there explains that all bodies continuously emit minute particles, or effluvia, which bridge the distance between them and the other bodies in their environments.<sup>69</sup> It is the emission of these particles, indeed, that allows distal bodies to causally interact with one and another. But if the emission of effluvia thus enables the casual interaction between bodies, it also means that each individual body “is like a River that is in a perpetuall course” as its physical make-up continuously changes with the emission of minute bits of matter and the impact of effluvia coming from other bodies on it. Some principle is needed to explain how a body survives this continuous emission and impact of particles, and this principle, for Digby, is form:

And consequently as long as the Form remaineth the same, the thing is the same . . . . Were it not for this, how could any body under heaven remain the same even but for a short Moments space? All sublunary things are in a perpetuall Flux.<sup>70</sup>

If inorganic bodies change as the result of the emission and impact of effluvia, the case of organic bodies is even clearer. In them, the alterations that result from the emission and impact of effluvia only add to the alterations that are the result of the intake of food and growth. But in organic bodies too, what enables them to survive all these changes and remain the same body over time, is a substantial form. As Digby puts it with regard to his own human body,

the continual floud of transpiration, and the continual supply of augmentation, do not hinder the Identity of this body of mine, as long as the Form which maketh it be what it is, remaineth still the same.<sup>71</sup>

And since, contrary to all other forms, human souls subsist and survive the corruption of the matter they inform, the exact same form that now gives identity to our bodies will eventually come to inform our glorious body. And as forms give identity to the matter they inform, this means that our glorious bodies will be genuinely identical with the ones we have now.

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form that identifies it and assumes a new form instead. The reason that he avoids this kind of talk in his discussion of animal generation, however, would seem to be that he thinks this sort of analysis may perhaps be at home in metaphysics, but does not advance our natural philosophical understanding of bodies.

<sup>67</sup>*Observations*, 84.

<sup>68</sup>*Observations*, 78.

<sup>69</sup>See *Two Treatises*, 138.

<sup>70</sup>*Discourse*, 93.

<sup>71</sup>*Discourse*, 99.

## 4. A DIVISION OF LABOR

It has been claimed that, with his conception of substances as compounds of matter and substantial form, Digby was “a typical proponent” of scholastic hylomorphism.<sup>72</sup> But while it is true that the kind of appeal to forms we find in Digby to account for substantial identity over time has its roots deep in scholastic tradition, at the same time it is clear that Digby’s branch of hylomorphism is quite different from that of many of his scholastic predecessors. For in scholastics such as Suárez, one of the main roles of form is to serve as the “source of all actions and motions” of a body, “from which its entire variety of accidents and powers originates.”<sup>73</sup> Indeed, it is in these terms that Descartes understands the scholastic notion of form as well, writing that forms had been introduced by the philosophers “solely to account for the proper actions of natural things, of which they were supposed to be the principles and bases.”<sup>74</sup> For Digby, by contrast, substantial forms are the exclusive domain of metaphysics. They have no role to play in natural philosophy, where the physical properties of bodies are explained in terms of the combination of elementary particles only.

With this division of labor, Digby’s account of form marks a sharp break with the natural philosophical understanding of forms and their function that we get in scholastics like Suárez. And part of what that means is that Digby’s notion of form avoids the criticism in Descartes and others to the effect that the scholastic theory of forms had failed at what surely was its important task. For while Descartes believed that the scholastics had introduced their forms for no other reason than to account for the physical properties of bodies, he also found that the theory of forms failed miserably at providing an intelligible account of bodies and their physical characteristics:

But no natural action at all can be explained by these substantial forms, since even their defenders admit that they are occult. . . . So these forms are not to be introduced to explain the causes of natural actions.<sup>75</sup>

But although this kind of criticism directly targets the natural philosophical understanding of forms that we get in authors such as Suárez, it leaves untouched the kind of hylomorphism that Digby envisions. Indeed, the very point of his division of labor, or so it would appear, is to have the best of two worlds. On the one hand, he can account for the generation and behavior of bodies in terms of the combination of elementary particles and proceed in natural philosophy without abstract notions like form. But, on the other hand, by retaining the concept of form to deal with metaphysical questions, he can account for bodily identity in a way that seems hard to do within an ontology that reduces bodies to conglomerates of particles in motion.

Digby’s division of labor here looks similar in some respects to the division of labor that Leibniz would formulate some forty years later, in his *Discourse on Metaphysics*. According to Leibniz, early moderns like Descartes had been right to

<sup>72</sup>Lloyd Strickland, “Resurrection of the Body,” 176.

<sup>73</sup>Substantial form is the “fons omnium actionum et naturalium motuum talis entis, et in qua tota illa varietas accidentium et potentiarum radicem et quamdam unitatem habeat” (Suárez, *Disputationes metaphysicae*, 15.1.7. In *Suarez Opera*, 25:499).

<sup>74</sup>Descartes to Regius, January 1642 (AT III.506/CSMK 208)

<sup>75</sup>Descartes to Regius, January 1642 (AT III.506/CSMK 208).



reject the notion of form as the explanatory tool that it had been in the natural philosophy of scholastic Aristotelianism. At the same time, however, he emphasized that the scholastic misuse of forms in natural philosophy “must not cause us to reject something whose knowledge is so necessary in metaphysics.”<sup>76</sup> If there is no job for forms in natural philosophy, indeed, they still have important work to do in metaphysics. In particular, Leibniz argued that, “if there were no other principle of identity in body” other than its shape, size and motion, “a body could not subsist for more than a moment.”<sup>77</sup> To account for the fact that a body that changes in regard of its shape, size, and motion yet survives and remains the same body over time, he concluded, the forms, “we must recognize in bodies something related to souls, something we commonly call substantial form.”<sup>78</sup>

It is no surprise, indeed, that Leibniz thought highly of Digby, and in a letter to Thomasius of April 1669 ranked him alongside men like Hobbes, Bacon, and Gassendi, whom he found were “either equals or even superiors of Descartes in age and in ability.”<sup>79</sup> But even so, Digby’s attempt at combining the best of two worlds is not without problems of its own. For if in the First Treatise we get the picture that bodies are little more than atomic composites of rare and dense parts, in other works we read that, at the same time, bodies are also the bearers of forms that give them an identity that does not depend on the presence of any of their material parts. And this raises the question of just how these two accounts of bodies, one atomic, one formal, fit together.

Digby himself never addresses this question. As Blank has argued, however, we may get a sense of what Digby had in mind by reminding ourselves of thinkers like Daniel Sennert, who had also tried to combine a corpuscular account of bodies with the Aristotelian notion of form. Not unlike Avicenna, Sennert maintains that mixtures have what we may think of as a two-tiered structure.<sup>80</sup> In the first tier, we find atomic portions of the elements. In the second, which supervenes on the first, we find a form that binds the elements together: “I maintain that . . . all the elements that are mixed and as it were made one, remain under the rule of some superior form, from which a specific unity results.”<sup>81</sup> The form that unites the elements, in this view, does so without imposing its own nature on them. For, as Sennert explains in his *Epitome scientiae naturalis*, even after their union “the elements not only remain in mixed bodies, but they in fact retain their forms perfectly and integrally.”<sup>82</sup>

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<sup>76</sup>Leibniz, *Discourse on Metaphysics*, section 10. References to the *Discourse* are according to section number in the translation by Garber and Roger Ariew.

<sup>77</sup>Leibniz, *Discourse on Metaphysics*, 12.

<sup>78</sup>Leibniz, *Discourse on Metaphysics*, 12.

<sup>79</sup>Leibniz, *Philosophical Papers and Letters*, 94. Mercer notes that Digby and Leibniz shared the wish to combine the best of the Aristotelian tradition with the best of the new philosophies. (*Leibniz’s Metaphysics*, 106–7). Focusing on the *Two Treatises*, however, she does not discuss the role that Digby, like Leibniz, sees for substantial form in accounting for substantial identity over time.

<sup>80</sup>For a detailed account of Sennert on forms, see Emily Michael, “Daniel Sennert on Matter and Form.”

<sup>81</sup>“existimo . . . omnes mistas et in unum quasi redactas sub superioris alicuius formae, a qua fiat unum specie, manere” (Sennert, *De chymicorum cum Aristotelicis et Galenicis consensu ac dissensu*, 357).

<sup>82</sup>“elementa non solum in mistis manere, sed et formas suas perfectas atque integras retinere” (Sennert, *Sennerti Opera*, 1:53–54). References to Sennert’s *Opera* are according to volume and page number in the 1650 edition.

Now Digby knew Sennert and may well have had a similar model in mind.<sup>83</sup> Thus, he may have believed that the constitution of a natural body would comprise two layers. The first layer would be that of its atomic parts and, in this layer, we would find portions of all of its ingredient elements. The second layer would then be that of its form. This form does not replace the nature of the elements, atomic portions of which, as we have seen, remain pure in the blend.<sup>84</sup> But while it leaves the ingredient elements intact, it still serves as a principle that binds them together and gives the whole an identity that survives alteration.<sup>85</sup>

But even if Digby may have had something like this in mind, the fact of the matter is that he never tells us just how his atomic and formal views of bodies go together. The case of his friend John Sergeant, however, is interestingly different in this regard. In Sergeant, indeed, we get the suggestion that the form of a body is not so much an extra layer that supervenes on its rare and dense parts, but rather just is the composition of rare and dense parts itself.

#### 5. JOHN SERGEANT

According to Sergeant, the form of a body is that which grounds its identity. The form of a body, indeed, is “that which so determines it as to constitute *This* or *That* body in particular.”<sup>86</sup> Part of what it means for a form to serve as the ground of identity in this way, according to Sergeant, is that it serves as that which distinguishes a mere heap of matter from a genuine substance. Each of the parts of a heap has a nature of its own, which is independent of that of the other parts of the heap. The parts of a genuine substance, however, share in a common nature, which gives them a unity that the parts of a heap lack. Form is the principle that brings about such unity.

At the same time, forms also function as principles that ground bodily identity over time. To illustrate the need for forms here, Sergeant briefly considers a young tree that, over the course of the years, increases a hundred times in quantity. The old tree is the same as the young one, only bigger. But clearly, its identity over time is not a function of the identity of its material parts, as the old tree may no longer have a single part in common with its younger self. Its identity over time, then, must lie in something else, and this something else is a form that remains constant.<sup>87</sup>

So far, then, Sergeant’s ideas on forms and their role looks similar to Digby’s. There is, however, one important point where the two part ways. For according to Sergeant, it is clear that the principal manifestation of the identity of a natural body just is its capacity to act in certain ways, and to engage in operations that are proper to it:

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<sup>83</sup>Sennert’s claim that the elements “retain their forms perfectly” first appears in the 1633 edition of the *Epitome*. In earlier editions, Sennert had held a version of Averroes’s view according to which the elements in the mixture are reduced to a refracted state. On this development, see Michael, “Daniel Sennert on Matter and Form,” 289–90.

<sup>84</sup>See *Two Treatises*, 143, and sect. 2 above.

<sup>85</sup>Even though Digby might have had something like this in mind, he would of course reject the claim in Sennert that the qualities and other physical characteristics of bodies “flow” from their forms. On this claim in Sennert, see Newman, *Atoms and Alchemy*, 139.

<sup>86</sup>Sergeant, *Metaphysics*, 12. See also *Metaphysics*, 107.

<sup>87</sup>For Sergeant as for Digby, inanimate bodies, too, undergo permanent alteration on the level of their material parts as they emit effluvia that allow them to interact with other bodies. See, for instance, *Solid Philosophy*, 65.

Bodies . . . being Distinct in their Individual *Essences*, must consequently (every thing *acting as it is*) have also some *distinct* Operation primarily and properly belonging them, and proceeding from them; that is, such as could not proceed from any other *Body*.<sup>88</sup>

The identity of a body and the way it behaves, then, for Sergeant are two sides of the same coin. Indeed, in the following passage, he tells us that the identity and the behavior of a body have a common root. That which determines the identity of a body and that which makes it act and behave the way it does, that is, are the same thing:

Whatever fits the Matter for the Performance of this Primary Operation, does essentially constitute *such a Thing* in Nature, or *such a Body*.<sup>89</sup>

But since what determines the identity of a body is its form, part of what he is telling us in this passage, is that the actions that are proper to a body follow from its form. And at this point, the notion of form has moved to the center, not just of the metaphysics of identity, but also of natural philosophy, which aims at a description of the way in which bodies behave and what they do.

Little seems left, then, of the division of labor we found in Digby. And this has implications for how Sergeant thinks of forms. For if Digby could still think of the form of a body as layer that supervenes on its atomic parts, for Sergeant this hardly is an option. For even though he does not adopt the division of labor of the First Treatise, Sergeant does hold that bodies behave the way they do as a result of the composition of their rare and dense parts. But this means that the composition of rare and dense parts in a body plays just the role he wants forms to play. And this suggests that, for Sergeant, the form of a composite body may not be so much a layer on top of its atomic parts, but the very order and composition of its rare and dense parts itself.

### 5.1 *Sergeant on Forms*

In the early chapters of his last work of philosophy, the *Metaphysics*, Sergeant inquires what it is that gives a body its proper mode of operating. In the case of a simple body or element, he claims, what gives it its proper mode of operating just is its degree of rarity or density. These “withall suffice to render them Capable of performing the Primary Operation Proper to them.”<sup>90</sup> This leads Sergeant to conclude that the degree of rarity or density of a simple body constitutes its essence. But when he speaks of the essence of a body, Sergeant often just means its form. And indeed, having said that the essence of a simple body is its rarity or density, he goes on to ascribe to the rarity or density of simple bodies some of the roles he elsewhere assigns to forms.

Thus, as we have seen, like Digby, Sergeant believes that the form of a body is what fixes its identity over time. But Sergeant goes on to spell out that claim in terms of rarity and density. A simple body counts as the same body at two moments of time, that is, if and only if at both moments, it has the degree of rarity or density that

<sup>88</sup>Sergeant, *Metaphysics*, 41.

<sup>89</sup>Sergeant, *Metaphysics*, 41.

<sup>90</sup>Sergeant, *Metaphysics*, 47.

sustains its proper mode of operating. The moment it loses this particular degree of rarity or density, it ceases to be the body it was and becomes a new individual:

The Individuality of a *Simple* Body or Element . . . would be alter'd if the Degree of Rarity and Density be so notably chang'd, that a vastly different Operation follows from it.<sup>91</sup>

The form of composite bodies receives a similar analysis. According to Sergeant, the form of a composite body is the set of accidents that gives rise to its proper mode of operating:

The Complexion of those Accidents, which . . . make the Thing fit for it's Primary Operation, is the *Form*.<sup>92</sup>

For as long as a composite body retains this complexion, indeed, it remains the same body. But the moment it loses this complexion, it loses its former identity and becomes a new individual:

It will not be hard to determine when the Individuality of the several Bodies in Nature are *Chang'd*, or *Lost*. There can be no doubt but that this happens when those bodies can no longer retain that Primogential Complexion of Accidents which make the Individuum fit to perform that Primary Operation, peculiar to itself as 'tis distinct from all other Individuums.<sup>93</sup>

Now first among the accidents that fix the proper operation of a composite body are the rarity and density of its ingredient parts. For when minimal, or atomic, portions of a rare and a dense element “cling together” in a stable way, Sergeant believes, this will give rise to what he calls a modified operation, or a mode of operating that, though different from that of the ingredient elements themselves, is characteristic of the combination of the two.<sup>94</sup>

But the rarity and density of its ingredient parts are not the only things that contribute to the proper operation of a composite body. For the shape, size, and place of its parts, too, will have an effect on the way it operates and behaves. These too, then, will belong to the form of a composite body. As Sergeant himself puts it, composite bodies,

besides their Different Degrees of Rarity and Density, must have in them a great variety of the Bulk, Figure, and Situation of their Parts: Which, *every thing operating as it is*, must needs make them operate *diversely*, and, consequently, *these* are parts of their *Essential Form*, and therefore . . . must constitute them *Distinct Agents* in nature, or *Distinct Bodies*.<sup>95</sup>

Or as he puts the point more briefly one page later, composite bodies are “Differenced by the Proportion, Size, and Figures of their Rare and Dense particles, and not a little by the Situation, or Manner of their Texture.”<sup>96</sup>

In Sergeant, then, the suggestion is that the form of a composite body is not some kind of layer that supervenes on its ingredient parts. Rather, the form of a composite body, for him, would just seem to be the texture of parts that, as a result

<sup>91</sup>Sergeant, *Metaphysicks*, 118.

<sup>92</sup>Sergeant, *Metaphysicks*, 44–45. The spelling “it's” is in the original.

<sup>93</sup>Sergeant, *Metaphysicks*, 115–16.

<sup>94</sup>Sergeant, *Metaphysicks*, 55.

<sup>95</sup>Sergeant, *Metaphysicks*, 58.

<sup>96</sup>Sergeant, *Metaphysicks*, 59.

of their shape, size, rarity, and density, give it a mode of operating that is proper to it, and so set it apart from all other bodies. As will become clear in the final section of this paper, with this notion of form, Sergeant was on the crossroad of traditions.

### 5.2 *Sergeant and a Cartesian Notion of Form*

For all their criticism of the scholastic theory of forms, many Cartesian thinkers were not opposed to the notion of form *per se*. We find a clear illustration of this in the work of the Cartesian author whose work Sergeant seems to have known best, and with whom he engaged in a fierce controversy over such topics as the Cartesian theory of ideas and the notion of form: Antoine Le Grand.<sup>97</sup>

In his *Entire Body of Philosophy* of 1694, Le Grand argues that for the scholastics, the form of a body was a kind of substance that was united to matter to serve as the inner source of bodily activity.<sup>98</sup> But this notion of form, according to Le Grand, is deeply flawed. Not only is it unclear what kind of substances these forms are supposed to be, but the scholastic account also raises the question of what will happen to a form when the matter of its body decays. Being a substance in its own right, after all, there is no good reason to think that the form will simply decay when the matter does. But to say that forms survive the matter of their bodies will not do either. For to say that forms survive the matter of their bodies is to treat them as human souls, and in this way to animate the whole of nature.<sup>99</sup>

But even if the scholastic notion of form is flawed, Le Grand finds no fault with the notion of form as such. In fact, he is happy to say that bodies have a form that makes them the kind of bodies they are, and which makes them behave the way they do. But the form of a body, according to Le Grand, is not some kind of substance added to matter. Rather, it simply is a complexion of accidents that is characteristic of the body, and which gives it the ability to act in certain ways:

*A material Form, therefore, is nothing else, but a Complexion of Affections and Modes, that are accommodate to a thing and to its performing several actions.*<sup>100</sup>

In this passage, Le Grand does not say which affections and modes he has in mind, but it seems clear that first among the affections and modes that characterize a body and sustain its power to act, is what he calls the “configuration” of its material parts.<sup>101</sup> Indeed, the following passage suggests that when Le Grand speaks of the form of a body, what he has in mind in the first place is the configuration of its material parts:

I answer that *Honey* is constituted such as it is by its *Form* and so essentially differs from *Wormwood*: But that this *Form* is a *Substance* I utterly deny, because the difference of these two, is only from the different configuration, situation, etc. of their *Parts*.<sup>102</sup>

<sup>97</sup>Mocking Sergeant’s critique of Descartes’s and Locke’s theory of ideas, Le Grand suggested that the initials I. S. with which Sergeant had signed some of his works identified him as an “Ideistarum Spreitor.” See *Dissertatio*, praefatio, 20.

<sup>98</sup>As Hattab has argued, Suárez did indeed think of form as a kind of substance joined to matter (*Descartes on Forms and Mechanisms*, 27 and 42–45).

<sup>99</sup>Le Grand, *Entire Body*, 103.

<sup>100</sup>Le Grand, *Entire Body*, 106.

<sup>101</sup>Le Grand, *Entire Body*, 103–4.

<sup>102</sup>Le Grand, *Entire Body*, 104. On similar Cartesian notions of form, see Pasnau, *Metaphysical Themes*, 569–70.

As the discussion around this passage makes clear, among the other accidents that are “*accommodate to a thing and to its performing several actions*” are the shape, size and motion of their ingredient parts.<sup>103</sup>

Now there are a number of things in this analysis Sergeant can agree with. For example, much like Cartesian thinkers such as Le Grand, Sergeant believes that in many scholastic accounts of form, matter and form function as two distinct entities in their own right that are, as it were, glued together to compose a new substance. Indeed, in *Solid Philosophy*, he singles out this notion of form as an entity in its own right joined to matter as one of the main reasons why so many of his contemporaries were turning their backs to the scholastic theory of forms.<sup>104</sup>

Moreover, Sergeant agrees with these contemporaries that this scholastic notion of form is flawed, and accuses the scholastics of “making a new Entity of every different Conception” when they infer from the fact that we can consider matter and form separately that there must in fact be two things here.<sup>105</sup> Like Le Grand, Sergeant holds that the form of a body is not so much a substance over and above its matter, as a “complexion” of accidents that characterizes a body and the way it behaves. And again, like Le Grand, he maintains that among these accidents, the configuration of a body’s material parts plays a crucial role.

But in spite of these points of agreement, Sergeant mounts an extensive critique of Le Grand’s account of form in a long Appendix to his *Method to Science* of 1696. The form of a body, he there argues, is that which is most intrinsic to it. It is the nature, or essence, of that body. But, on Le Grand’s account, the form of a body is but the arrangement of its material parts. And that, Sergeant claims, is “merely an Extrinsic Notion.” Hence, when Cartesians like Le Grand speak of the form of a body to refer to the arrangement of its material parts, they do not use the word “in a proper and Natural sense, but utterly pervert” it.<sup>106</sup>

Le Grand read the Appendix to Sergeant’s *Method* and responded to it two years later in an appendix to his own *Dissertatio de ratione cognoscendi*. There, he claimed that few things could be more intrinsic to a body than the order and disposition of its material parts. It is perfectly natural, then, to think of these as constitutive of bodily form: “but because this disposition of parts is in the thing itself, and as it were is its whole visceral make-up, it is the core of its form, or nature and essence.”<sup>107</sup> Sergeant’s criticism that a configuration of bodily parts was but an “Extrinsic Notion” that therefore could not make up the form of a body, then, had been unfair.

Le Grand’s response to Sergeant here seems straightforward enough. However, it fails to address Sergeant’s main worry about form as conceived by Cartesians like Le Grand. For when he writes that the configuration the order and configuration of bodily parts is an “Extrinsic Notion,” Sergeant’s point is not to deny that, in Le

<sup>103</sup>Le Grand, *Entire Body*, 106.

<sup>104</sup>Sergeant, *Solid Philosophy*, 94.

<sup>105</sup>Sergeant, *Solid Philosophy*, 95. On this point in Sergeant, see also Sarah Hutton, *British Philosophy*, 86.

<sup>106</sup>Sergeant, *Method*, 420.

<sup>107</sup>“Cum tamen haec partium *Dispositio* Rei ipsi inest, ejusque quasi Viscera omnia, *Formam* seu *Naturam* et *Essentiam* intime ingreditur” (Le Grand, *Dissertatio*, 112).

Grand's words, "this disposition of parts is in the thing itself." Rather, his point is that to yield a particular kind of substance, the parts of a body must not only have the right order and configuration, but they also need to have the right inner nature. Indeed, if "he that builds a House does not know the *Intrinsecal* temperament or Consistency of his materials," the builder "will make but a ruinous and bungling piece of work."<sup>108</sup> And in the same way, no matter how well they are arranged, material parts will not suffice to build up natural bodies unless they have the right kind of inner constitution. But the Cartesians lack an account of this inner nature, he thinks. In their view, there is but one kind of matter in the universe, and individual parts of matter differ on account of properties such as their figure, size, and motion. But the figure, size, and motion of a thing, Sergeant believes, are not a part of its inner nature. They are "extrinsic" to it, in the sense that a thing might lose its figure, size, or motion while still remaining the same thing.<sup>109</sup> As he put it in his *Ideae cartesianae*, in which he responded to Le Grand's *Dissertatio*,

On this doctrine, no two bodies in the entire world will be *essentially*, or *intrinsically* different. Instead, all bodies will be *accidentally* different only, or different in regard of their *Disposition*.<sup>110</sup>

In his own view, what gives a part its inner nature is its degree of rarity or density. This it cannot lose without also losing its identity as a material of a certain kind, and thus is intrinsic to its very nature. But when Sergeant speaks of the rarity or density of a body, he is borrowing his account from Digby and defines it as the "Proportion of Quantity to the Matter or Subject of it."<sup>111</sup> On this account, there is a real distinction between matter and extension. All by itself, matter is not extended in space. Quantity is the accident that gives a given portion of matter an extension in space to yield a body that is either rare or dense. The larger the quantity of a given portion of matter, the rarer the body that will result. The smaller, the denser the body will be. Clearly, this account of rarity and density with its real distinction between matter and extension would be unacceptable to Cartesians like Le Grand. When Sergeant describes the form of a composite body as a texture of rare and dense parts, then, he is relying on a notion of extension that is deeply alien to Cartesian thought, but at the same time integrates it in an account of form that takes on board some of the criticism that Cartesians like Le Grand were raising for the scholastic concept of form.

## 6. CONCLUSION

In Digby and Sergeant, we find two Aristotelian thinkers who were aware of some of the problems that were being raised for the notion of form. Both tried to accommodate these problems without rejecting the notion of form altogether but did so in interestingly different ways. Thus, in Digby, we find a division of labor where natural philosophy treats of bodies as atomic compounds only, and

<sup>108</sup>Sergeant, *Method*, 419.

<sup>109</sup>Sergeant, *Method*, 384–85.

<sup>110</sup>"E qua doctrina, nulla Corpora, in toto Mundo, *Essentialiter* seu *Intrinsece* diversa erunt, sed omnia different *Accidentaliter* tantum; seu quoad *Dispositionem*" (Sergeant, *Ideae cartesianae*, 256–57).

<sup>111</sup>Sergeant, *Method*, 400.

where the notion of form is relegated to metaphysics to account for bodily identity over time. With this view on the role of forms, he not only parts way with a long scholastic tradition where the notion of form was central to the natural philosophy of bodies, but also avoids a standard line of criticism of forms in early modern thinkers such as Descartes.

For Sergeant, however, the behavior and identity of a body were two sides of the same coin. As principles of identity, then, they should play an important role in natural philosophy. But Sergeant recognized that forms cannot play any such role if they are conceived of in a scholastic way as substances in their own right that are added to the matter of a body. His own view was that the form of a body may just be the composition of its rare and dense parts. With this notion of form, he built on the First Treatise, and at the same time suggested an answer to a question that had remained open in Digby. For if Digby never tells us just how the form that identifies a body relates to its texture of rare and dense parts, the suggestion in Sergeant is that these are just two descriptions of one and the same thing.<sup>112</sup>

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