

Material Difficulties:

Matter and the Metaphysics of Resurrection in Early Modern Natural Philosophy

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1. Introduction

When Bruno was burned at the stake in 1600, philosophers were still inclined to offer natural explanations in Aristotelian terms. Neither the physical proposals of Bruno himself, nor those of other prominent non-Aristotelians like Paracelsus had diminished the power of the explanatory model offered by the scholastics. For those philosophers watching the demise of Bruno in the Campo dei Fiori in Rome, the burning of the wood and its subsequent effects would have been explained adequately in terms of matter and substantial form. For such Aristotelian philosophers, all natural objects are constituted of matter and form, and natural events are explained in terms of the actualization of the potency of these two “principles of nature.” By the time Kenelm Digby composed his *Two Treatises* of 1644 and Thomas Hobbes his *De Corpore* in 1655, there was a new explanatory model available to explain such events, one that had greatly diminished the power of the scholastic model.¹ According to the mechanical philosophy, nature is composed of matter—whether the *res extensa* of Descartes, the atoms of Gassendi, or one of the many less popular accounts of corporeity—whose actions and interactions cause and explain all the phenomena of nature. For the mechanist, therefore, all physical phenomena are to be explained in terms of some kind of matter and motion. Although these thinkers disagreed about how to define the material component in nature, they all took it to be entirely devoid of substantial forms. For our purposes here, it will be helpful to distinguish between *first wave* and *second wave mechanists*. A first wave mechanist is someone like Descartes, Galileo, Hobbes, or Gassendi who proposed a version of the mechanical explanatory model before (roughly) 1650. A second wave

mechanist is a philosopher working in the second half of the seventeenth century who accepts the mechanical explanatory model. For our purposes, it is important that many second wave mechanists were prepared to reject the scholastic explanatory model, replace it with the mechanical one, and yet were not content to accept the metaphysical grounding of the mechanical physics offered by the first wave mechanists.

I do not mean to imply that first wave mechanists like Descartes, Gassendi, Hobbes, and Galileo considered themselves players on the same team. While each of these “new” philosophers defined himself against the Aristotelians, each also identified himself in opposition to one or more of the others. Because many of the details of their views stand in contradistinction to one another (e.g., on the void, on the cause of motion, on the existence and nature of incorporeal beings, etc.), it is all the more striking that so many second wave thinkers tended to lump them together. Consider, for example, Anne Conway’s *Principles of the Most Ancient and Modern Philosophy*, written in the 1670s. Although Conway is keen to note the dissimilarities between “Cartesianism and Hobbesianism,” the differences that interest her concern their views about “incorporeals” and “spirits.” Distinguishing clearly between her “fundamental principles” and their “false philosophy,” she nonetheless admits “the remarkable and ingenious things concerning the mechanical aspects of natural processes” which are proposed by these philosophers.² It is important to recognize that despite the doctrinal dissimilarities among Descartes, Hobbes, Galileo, and Gassendi, and despite the fact that they saw themselves as very different, their immediate successors were often happy to consider them members of the same school.

The history of the mechanical philosophy and its contribution to what has traditionally been called “the scientific revolution” have been much discussed,³ and the subtleties of the doctrinal differences among the “mechanical” philosophers have begun to be noted.⁴ Despite recent scholarly reevaluations of the demise of the Aristotelian philosophy and despite our greater understanding of the discrete forces behind the rise of the new physics, it remains a fact that the mechanical explanations of physical phenomena won the day against those of the Aristotelians. But what has gone mostly unnoticed in this account is that the metaphysical foundations of that physical model were *not* a success. As Conway makes perfectly clear, the mechanical explanations are “ingenious” and helpful, but based on utterly “false principles.” Such philosophers, insists Conway,

have generally erred and laid a poor foundation from the beginning. . . . From such an absurd foundation, many other most crass and dangerous errors have arisen, not only in philosophy but also

in theology with great injury to the human race, to the detriment of true piety, and in contempt of the most glorious name of God.⁵

This tension between physics and metaphysics—between the explanations given of physical phenomena and the principles that underlie those explanations—had a major influence on seventeenth-century thinkers and hence on the development of early modern science. Conway, Leibniz, and other prominent seventeenth-century thinkers found severe problems with the metaphysical proposals of the “new philosophers.” Many of these problems were generated by their account of matter. Among the most serious of these is that of substantial identity. That is, many second wave mechanists embraced the physical explanations of the new philosophy and yet rejected core doctrines of its proponents.

In their eagerness to replace scholastic physical explanations with mechanical ones, philosophers like Galileo, Descartes, Hobbes, and Gassendi either ignored or refused to answer a number of traditional metaphysical questions concerning identity, especially substantial identity.⁶ Because theological doctrines as important as the Eucharist and the resurrection of the body depend crucially on such an account, the failure of the mechanists in this regard seemed severe to many seventeenth-century thinkers. The failure of the first wave mechanists to offer adequate metaphysical grounding for such theological doctrines put many thoughtful philosophers in a difficult spot. On the one hand, they were persuaded by the physical explanations of the new mechanical philosophy; on the other hand, they could not embrace a philosophy in tension with fundamental Christian doctrines. Some of these philosophers attempted to ground the new physics in a way that would accommodate their theological commitments. In this paper, I focus on one such theological doctrine, namely, the doctrine of the resurrection. After describing the doctrine, I present Aquinas’ neat way of accounting for it, and then reveal the tension between the doctrine and the account of material substance assumed by first wave mechanical philosophers. I propose that many philosophers working in the second half of the seventeenth century—many second wave mechanists—were critical of the mechanical philosophy for this reason. I use Leibniz as an example of someone willing to rework the mechanical philosophy so that it could accommodate the doctrine of resurrection.

2. The Metaphysics of the Resurrection

The Christian doctrine of the resurrection creates severe metaphysical demands on any thinker concerned to construct a philosophy consistent with Christian theology. Many fundamental Christian beliefs depend

on the fact that human beings will be resurrected, as was Jesus Christ before them. The doctrine maintains that at some time in the future, our immortal soul will be reunited with its long-buried mortal body. Paul makes clear the centrality of the doctrine:

Do you not know that all of us who have been baptized into Christ Jesus were baptized into his death? We were buried therefore with him by baptism into death, so that as Christ was raised from the dead by the glory of the Father, we too might walk in newness of life. For if we have been united with him in a death like his, we shall certainly be united with him in a resurrection like his. We know that our old self was crucified with him so that the sinful body might be destroyed, and we might no longer be enslaved to sin. For he who has died is freed from sin. But if we have died with Christ, we believe that we shall also live with him. (Romans 6.3-8)⁷

Although Paul himself seems to distinguish between the body of the flesh and the “spiritual body” (1 Corinthians 15.42), the idea evolved among Christian theologians that the resurrected body must be (in some sense) the same as the one that died. So the basic philosophical question became: how can it be the same human substance that persists through the radical changes in a human life, then dies, and then is resurrected? Paul himself hints at a possible answer: “And what you sow is not the body which is to be, but a bare kernel, perhaps of wheat or of some other grain. But God gives it a body as he has chosen, and to each kind of seed its own body” (1 Corinthians 15.37-8). The underlying metaphysics here may be interpreted as follows: There is some sort of substantial core that underlies all the changes of the substance, including the radical changes of death, the disintegration of the flesh-and-blood body, and the resurrection of a body which, despite its more spiritual nature, contains its former core.⁸

3. Scholasticism and Substantial Identity

For most Aristotelian philosophers, natural objects are constituted of two principles, matter and form, and natural events are explained in terms of the actualization of the potency of these two principles. Roughly speaking, for the scholastics, the substantial forms of bodies possess innate powers that incline those bodies to behave in characteristic ways: fire, for example, contains the innate power to heat and to rise while rocks possess the tendency to fall. Although scholastics differed widely about the right way to characterize matter, form, and substance, they agreed that the active form combines with the passive matter to create an individual concrete substance. For such philosophers, the problem of substantial identity was relatively easy to solve: an individual concrete substance like Socrates persists as long as the union of form and matter does. As long as Socrates’ substantial form

organizes and activates his material component, he is the very thing that he is. Moreover, the Aristotelian account of substance is perfectly consistent with substantial change. The oak tree grows new leaves in the spring and yet remains the same thing. Socrates loses his hair and yet remains the very person that he is.

Many scholastics considered their account of identity to be closely related to their account of substantial unity. The underlying assumption here is that despite changes to the substance, as long as it remains the same unified thing, it retains its identity. The tree regains its leaves, Socrates loses his hair, but both substances retain their underlying substantial unity.

There was a good deal of disagreement among scholastics about the principle or source of substantial identity and unity. For our purposes, it will be helpful to cite briefly some of the relevant claims made by Duns Scotus. Scotus famously proposes haecceity or “thisness” as the source of the individuation and identity of a substance. For Scotus, as long as an individual substance retains the “thisness” of its substantial form, it will remain the thing that it is. He asserts: “An actually existing substance, not changed by any substantial change, cannot from ‘this’ become ‘not this’. For this singularity, according to what was just said, cannot be one singularity and another in the same substance that remains the same and is not substantially changed.”⁹ For our purposes, the metaphysical *tenacity* of substantial unity and identity is noteworthy. As long as a substance retains its substantial form, “it remains the same substance numerically.”

For the scholastics, the substantial form did a lot of metaphysical work. It should not come as a surprise, therefore, that when the “new philosophers” stripped the world of substantial forms, they faced a number of difficult metaphysical problems. Before turning to some of the most prominent of these problems, it will be interesting to consider the tidy success of Aquinas’ account of resurrection.

4. Aquinas on Resurrection

The Aristotelian notion of substance, as interpreted by many scholastics, seems custom-made to solve the problem of resurrection. In his *Summa Contra Gentiles*, Aquinas discusses the doctrine at length. Citing what “the apostle” wrote in Corinthians, he concludes: “It is, then, a necessary tenet of faith to believe that there will be a resurrection of the dead.”¹⁰ According to Aquinas, Paul is perfectly clear that the resurrection is not just a “spiritual” one and therefore that “it is the body that will rise” (SG IV, 79.7). In confirmation, Aquinas cites Job who says: “in my flesh I shall see God” (Job 19.25-6). According to

Aquinas, the soul is immortal and can exist without its body. However, Aquinas' metaphysics requires that the "natural" place of the soul is to be joined with its body and therefore the metaphysics perfectly motivates the resurrection of the body. Aquinas argues: "[I]t is contrary to the nature of the soul to be without the body" and "since nothing contrary to nature can be perpetual . . . the soul will not be without the body perpetually. . . . Therefore, the immortality of the soul seems to demand a future resurrection of bodies" (SG IV, 79.10).

In presenting his account of resurrection, Aquinas deals directly with our problem, namely, how the body or corporeal substance can be "numerically one from the beginning of his life to the end of it," despite life's radical changes. He summarizes his point:

But in the body of man, so long as he is alive, it is not with respect to matter that he has the same parts, but with respect to his species. In respect to matter, of course, the parts are in flux, but this is not an obstacle to his being numerically one from the beginning of his life to the end of it. (SG IV, 81.12)

According to Aquinas, "although not everything that is in him materially in one state is also there in another," this is not a problem since "the form and species . . . remain continuously through a whole life" (ibid.). In short, "that he should assume again . . . the same body and bodily parts that were with him in life" is "not a requirement of man's arising [from the dead] with numerical identity." Rather, "he need assume . . . only what suffices to complete the quantity due." In the end, then, regardless of the particular material parts, as long as there is the relevant quantity and as long as the soul or form is there, the body will be resurrected.

But how does the soul or form create such a robust single thing with the matter? The key to Aquinas' answer is his account of substantial unity. In part II of the *Summa Contra Gentiles*, Aquinas is keen to show that Plato is wrong to claim that the body and the soul are separate. The human soul can exist separately from its body (as it does between the dissolution of the body after death and the resurrection). Nonetheless, when the soul is joined with its body, they "have not each a distinct being" but rather "make up one single being."¹¹ Flatly rejecting Plato's view that the human soul is related to the body "as its mover," Aquinas insists that the human soul is "united to the body as its form." He then offers a very nice account of the relation:

For one thing to be another's substantial form, two requirements must be met. First, the form must be the principle of the substantial being of the thing whose form it is; I speak not of the productive but of the formal principle whereby a thing exists and is called a *being*. The second requirement then follows from this, namely, that

the form and the matter be joined together in the unity of one act of being. . . . And this single act of being is that in which the composite substance subsists: a thing one in being and made up of matter and form. (SG II, 68.2-3)

Despite the fact that the scholastic account of matter—especially Aquinas’ notion of prime matter—is notoriously difficult, it seems safe to say that when the substantial form of a substance actualizes or “reduces” the potency of its matter (*reducere ad actum*), it necessarily forms a unity with it. The matter forming the unity with the form simply cannot be separated from the form and therefore cannot strictly have components added or subtracted. For our purposes, it is particularly important that as long as the substantial form in a substance creates a unity with its material component, the identity of that substance persists. Thus, Paul’s body might have turned to dust, but when his soul reunites with some material component at resurrection, the same corporeal substance will exist. As long as Paul’s form joins in “one act of being” with matter of the appropriate “quantity,” the substantial unity that is Paul will exist.

5. Mechanical Physics and Metaphysical Problems

Descartes’ *Principia Philosophiae* of 1644 was intended to replace the scholastic explanatory model as an account of “the entire visible world.”¹² According to Descartes, there is “no phenomenon of nature” which cannot be explained by the principles enumerated in his treatise, namely, the various sizes, shapes, and motions which are found in all bodies. According to Gassendi in the *Syntagma* of 1658,

the matter of the world and all the things contained in it is made up of atoms . . . which God created finite from the beginning, which he formed into this visible world, which, finally, he ordained and permitted to undergo transformations out of which, in short, all the bodies which exist in the universe are composed.¹³

Whether it was Descartes, Gassendi, or one of the other first wave mechanists, the scholastic explanatory model had to be rejected and natural phenomena were to be explained by appealing to matter and motion. That is, an explanation of physical phenomena is consistent with the mechanical explanatory model just in case it appeals to some sort of matter, the features of that material stuff, and its motion. As Steve Nadler nicely summarizes Descartes’ position:

Physical bodies just are parcels of matter in motion, collections and configurations of such parts. Hence, all the real and apparent properties of a body (its shape, size, solidity, color, taste, texture, etc.)

are explained by means of the size, shape, position or configuration, and motion of its constituent material particles.¹⁴

It did not take long to digest and respond to the philosophical proposals of first wave mechanists. By the 1650s, there were many philosophers prepared to reject the scholastic explanatory model and replace it with the mechanical one. What struck many second wave mechanists as right about the mechanical philosophy was the idea that the corporeal features of natural bodies were to be explained in terms of matter and motion, so that there was no need for “mysterious” innate tendencies.¹⁵ Whether it was the shape of the wood or the heat of a fire, corporeal features were reducible to some form of extension and motion. But many second wave mechanists were concerned with the various metaphysical difficulties posed by the first wave thinkers. Throughout Europe, protests were made against the metaphysical inadequacies of first wave thinkers. In Germany, Johann Clauberg criticized Descartes for not attending enough to the “thisness” of the corporeal substance.¹⁶ In England, Anne Conway proposed that these mechanists had inappropriately stripped the world of activity.¹⁷ And in France, Jean-Baptiste du Hamel claimed that while the new philosophy explains many of the phenomena, it does not account for their “ultimate source.”¹⁸ That is, many second wave mechanists would have agreed with Leibniz’ comments in section 10 of the *Discourse on Metaphysics*:

I agree that the consideration of these forms serves no purpose in the details of physics and that they ought not to be used to explain particular phenomena. In this the scholastics failed . . . thinking that they could account for the properties of bodies by mentioning forms and qualities, without taking the pains to examine the manner of their operation.¹⁹

But Leibniz is equally clear about the fact that although “the physicist can give an explanation of his experiments” by the careful use “of geometric and mechanical demonstrations,” ultimately he must return to metaphysics.

6. The Mechanical Physics and the Problem with Resurrection

If the body of Paul is a collection of extended corpuscles, then it becomes difficult to grasp how that collection might be resurrected and joined with his soul. Even philosophers who thoroughly embraced the new philosophy recognized its weakness on theological points in general and on the doctrine of resurrection in particular. Robert Boyle himself was keen to show that the mechanical account of nature could be made to cohere with Christian doctrines. In *Some Physico-Theological Considerations about the Possibility of the Resurrection*, Boyle is unwill-

ing to side-step the issue of resurrection although he admits at the beginning of that work that “if God had not had the scripture positively reveal his purpose of raising the dead, I confess I should not have the thought of any such thing.”²⁰

Leibniz’ “return to metaphysics” is overdetermined and he offers many different reasons for his rehabilitation of substantial forms throughout his life. The most important of these, for our purposes, concerns the doctrine of resurrection. Leibniz is perfectly clear about the fact that Descartes and other philosophers who maintain that the nature of body consists in extension contradict “our mysteries.” In a letter of 1679, he makes the point succinctly:

There is another important thing in my philosophy which will give it access to the Jesuits and other theologians. This is my restoration of substantial forms, which the atomists and Cartesians claim to have exterminated. It is certain that, without these forms . . . it is impossible to explain our mysteries. (A II.1, 490)

I have argued in my book, *Leibniz’ Metaphysics: Its Origins and Development*, that Leibniz developed some of the core elements of his metaphysics in order to explain the Christian mysteries, namely, the Eucharist, the immortality of the soul, the trinity, the resurrection, and so on.²¹ He was interested in them all. About the resurrection, he had a good deal to say. Consider an essay that he attached to a letter of 1671. In it, he discusses the doctrine at length and criticizes Boyle’s treatment. The essay, entitled “On the Resurrection of Bodies,” is a long-winded and odd text that considers, among other things, cannibalism and the bones of Lazarus. Throughout the essay, however, Leibniz’ main concern is to explain how the soul may be rejoined with its original body at resurrection even though the parts of that body may be “scattered all over the world.”²²

Leibniz insists that the standard mechanical accounts of matter as passive stuff pose grave difficulties for the doctrine. He argues roughly as follows. For someone who accepts the existence of body as extended stuff (whether Descartes’ *res extensa*, Gassendi’s atoms, or some other form of extended corporeity), either there is some kind of general material stuff or there are material atoms. In the former case, because the matter of bodies will be in “continuous flux,” there is no single identifiable thing to be resurrected. In the latter case, while it is true that atoms (by definition) persist and therefore that the atoms of a particular body could be reassembled, a number of questions arise due to the long lives of these basic material elements. It is at this point in the text that Leibniz indulges in a number of thought experiments involving cannibalism. He points out, for instance, that if one person ingests the

body of another and absorbs those atoms, then it is unclear to whom the atoms belong. Although Leibniz thinks that, at resurrection, they would probably belong to the first person to have them, his point is that the standard theory of atoms cannot explain resurrection. He is keen to make evident that the issue here is important. At the time of resurrection, the good Christian wants to make sure that it is her body and not someone else's accompanying her soul through the pearly gates.

For our purposes, the important moral to the story is that there is more to a body than organized matter. In the letter accompanying the essay, Leibniz writes: "I am of the opinion that in a body, whether of a human being or animal, vegetable or mineral, there is a core [*Kern*] of its substance. . . . This core is so subtle that it remains also in the ashes of burned things and can, so to speak, draw itself into an invisible center" (A II.1, 108). That is, Leibniz seems to take up Paul's suggestion that I will exist when my core does. But what is this core? In short, it is a combination of an active mind or substantial form and some bit of passivity that the mind organizes and through which it acts. As Leibniz writes, "in everything there is a certain seminal center that is diffused throughout the thing" (A II.1, 116). This center is "the fountain of life" and that "in which the very soul is implanted." The "subtle spirit or substance" cannot be destroyed but will survive through fire and other changes as "the flower of substance." Leibniz insists that his theory has many benefits. Besides solving the problem of resurrection, it explains "the generation of plants from seeds," the development of the seed in the uterus, and "the essences of chemicals." Leibniz is proud that his theory agrees with "the Jews" (A II.1, 117). He explains: "Indeed, the Jews maintain that, in a certain little bone, which they call *Luz*, the soul with this flower of substance remains unconquered by anything that happens." Whether it is the development of a crystal, the generation of a plant, the movement of an object, or the resurrection of the body, the same process occurs: there is a core of substance that diffuses the thing.

But what about the dramatic changes which every human being suffers in the eternity of existence? In the letter, Leibniz acknowledges those changes. He explains that the core is like "an embryo or seed of an animal"²³ which contains "the core of the whole body" (A II.1, 109). He insists that "this core of the substance of a human being neither increases nor decreases although its clothing and casing [*Kleidt und Decke*] are in constant flux." These fluctuations are extreme. Not only is "the core of the whole body" able to spread throughout the body, it is also able to "retract itself back to its source and fountain" where it is in a state of such subtlety that "no force . . . is able to damage it."

Leibniz' theory of a core of substance is clever: it explains how a substance is able to remain fundamentally the same and yet undergo the changes of growth and death. In the case of Paul, for example, he grows from infant to adult, then dramatically shrinks and expands between the moments of death and resurrection. Although all of these modifications are part of his substance, underneath these variations in his passive principle stands his unchanged core. Because the core just is his soul and body, it is ripe for life, death, and resurrection.

7. Conclusion

On the hundredth anniversary of Bruno's death, no self-respecting natural philosopher would have appealed to substantial forms in explaining the physical phenomena of poor Bruno's demise. The success of the mechanical philosophy in the seventeenth century is enormously important, and the historical events leading to its dominance constitute a major part of the history of modern science. But its success is a much more complicated and varied process than historians generally acknowledge. The mechanical philosophy failed to solve a number of metaphysical and theological problems. In the second half of the seventeenth century, this led many progressive thinkers to reconsider the metaphysical grounding of that physics. By focusing on one of the many problems that faced the mechanical philosophy, I have tried to excavate a part of the history of that reconsideration. There is much more work to be done.

NOTES

1. A new generation of scholars has begun to document that the traditional categories of old and new, Aristotelian and modern are not what they once seemed. See, e.g., Allen G. Debus, *Man and Nature in the Renaissance* (Cambridge: Cambridge University Press, 1978); Thomas Leinkauf, *Mundus combinatus: Studien zur Struktur der barocken Universalwissenschaft am Beispiel Athanasius Kirchers SF (1602-1680)* (Berlin: Akademie Verlag, 1993); Roger Ariew, *Descartes and the Last Scholastics* (Ithaca: Cornell University Press, 1999); Stephen Menn, *Descartes and Augustine* (Cambridge: Cambridge University Press, 1998); Christoph Lüthy and William R. Newman, "Matter and Form: By Way of a Preface," *Early Science and Medicine* 2:3 (1997), pp. 215-26; Daniel Garber, John Henry, Lynn Joy, and Alan Gabbey, "New Doctrines of Body and its Powers, Place, and Space," in *The Cambridge History of Seventeenth-Century Philosophy*, ed. Daniel Garber and Michael Ayers (Cambridge: Cambridge University Press, 1998), pp. 553-623; Cees H.

- Leijenhorst, *The Mechanisation of Aristotelianism: The Late Aristotelian Setting of Thomas Hobbes' Natural Philosophy* (Leiden: Brill, 2002); Cees Leijenhorst, Christoph Lüthy, and J.M.M.H. Thijssen, eds., *The Dynamics of Aristotelian Philosophy from Late Antiquity to the Seventeenth Century* (Leiden: Brill, 2002); and my "Kenelm Digby," in *Routledge Encyclopedia of Philosophy*, ed. Michael Ayers, et al. (London: Routledge, 1998). Compare these to standard treatments by Edwin A. Burtt, *The Metaphysical Foundations of Modern Physical Science*, rev. ed. (Garden City, NY: Doubleday, 1954); Marie Boas, "The Establishment of the Mechanical Philosophy," *Osiris* 10 (1952), pp. 422-33; Eduard J. Dijksterhuis, *The Mechanization of the World-Picture*, trans. Carry Dikshoorn (Oxford: Clarendon Press, 1961); and Robert H. Kargon, *Atomism in England from Harriot to Newton* (Oxford: Clarendon Press, 1966).
2. Anne Conway, *Principia Philosophiae Antiquissimae & Recentimissae* (Amsterdam, 1690); *The Principles of the Most Ancient and Modern Philosophy*, ed. Allison P. Coudert and Taylor Corse (Cambridge: Cambridge University Press, 1996), chap. 9, §2.
 3. See, e.g., Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 1996).
 4. See, e.g., Alan Gabbey, "Henry More and the Limits of Mechanism," in *Henry More (1614-1687): Tercentenary Studies*, ed. Sarah Hutton (Dordrecht: Kluwer, 1990), pp. 19-36; Leijenhorst, *Mechanisation of Aristotelianism*; and especially Christoph Lüthy, John Murdoch, and William R. Newman, eds., *Late Medieval and Early Modern Corpuscular Matter Theories* (Leiden: Brill, 2001).
 5. Conway, *Principles*, chap. 9, §1.
 6. I do not mean to suggest that historians have not noted the criticisms leveled against first wave mechanists. See e.g., Desmond M. Clark, *Occult Powers and Hypotheses: Cartesian Natural Philosophy Under Louis XIV* (Oxford: Oxford University Press, 1989); Theo Verbeek, *Descartes and the Dutch: Early Reactions to Cartesian Philosophy, 1637-1650* (Carbondale: Southern Illinois University Press, 1992); Ariew, *Descartes and the Last Scholastics*, chaps. 8-9; Dennis Des Chene, *Spirits and Clocks: Machine and Organism in Descartes* (Ithaca: Cornell University Press, 2001); and Stephen Gaukroger, John Schuster, and John Sutton, eds., *Descartes' Natural Philosophy* (London: Routledge, 2000). But no one, as far as I know, has thoroughly analyzed the full range of theological reasons behind the criticism leveled against the mechanists.
 7. Biblical quotations are from the Revised Standard Version.
 8. I do not mean to suggest that this is Paul's view. How Paul intended to explain what he says is not clear.
 9. John Duns Scotus, "Six Questions on Individuation," in *Five Texts on the Medieval Problem of Universals*, trans. and ed. Paul Vincent Spade (Indianapolis: Hackett, 1994), qu. 4, §77.
 10. Thomas Aquinas, *Summa Contra Gentiles IV: Salvation*, trans. Charles J. O'Neil (Notre Dame: University of Notre Dame Press, 1975), chap. 79,

- para. 4; hereafter cited as SG IV, followed by chapter and paragraph number.
11. Aquinas, *Summa Contra Gentiles II: Creation*, trans. and ed. James F. Anderson (Notre Dame: University of Notre Dame Press, 1975), chap. 57, para. 6; hereafter cited as SG II, followed by chapter and paragraph number.
 12. René Descartes, *Principia Philosophiae*, vol. 8A of *Œuvres de Descartes*, ed. Charles Adam and Paul Tannery (Paris: Vrin, 1964-76), pt. 4, §199.
 13. Pierre Gassendi, *Physica*, in *Syntagma Philosophicum*, vols. 1-2 of *Opera Omnia* (1658; reprint Stuttgart: Friedrich Frommann, 1964), sect. I, bk. III, chap. 8.
 14. Steven Nadler, "Doctrines of Explanation in Late Scholasticism and in the Mechanical Philosophy," in *The Cambridge History of Seventeenth-Century Philosophy*, p. 523.
 15. See my "The Vitality and Importance of Early Modern Aristotelianism," in *The Rise of Modern Philosophy*, ed. Tom Sorell (Oxford: Clarendon Press, 1993), pp. 33-67.
 16. Johann Clauberg, *Opera Omnia Philosophica* (1961; reprint Hildesheim: Georg Olms, 1968).
 17. Conway, *Principles*, chap. 9, §2.
 18. Jean-Baptiste du Hamel, *Philosophia vetus et nova ad usum scholae accommodata; Astronomia physica, De meteoris et fossilibus libri duo, et De consensu veteris & novae Philosophiae* (Nuremberg, 1681).
 19. Gottfried Wilhelm Leibniz, *Discourse on Metaphysics*, in series VI, vol. 4 of *Sämtliche Schriften und Briefe*, ed. Deutsche Akademie der Wissenschaften (Berlin: Akademie Verlag, 1923-). I cite the Akademie edition as A, followed by series, volume, and page numbers; translations are my own.
 20. Robert Boyle, *Some Physico-Theological Considerations about the Possibility of the Resurrection*, in vol. 4 of *The Works of the Honourable Robert Boyle*, ed. Thomas Birch (1772; reprint Hildesheim: Georg Olms, 1966), p. 192.
 21. Christia Mercer, *Leibniz' Metaphysics: Its Origins and Development* (Cambridge: Cambridge University Press, 2001).
 22. Leibniz, "On the Resurrection of Bodies," A II.1, 115. In his discussion, Leibniz cites Biblical chapter and verse.
 23. The text is: "dem foetu oder frucht der Thiere." As this phrase suggests, Leibniz' Baroque German does not always conform to modern spelling, punctuation, or the convention of capitalizing nouns.