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Lisa Downing

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## The Status of Mechanism in Locke's *Essay*

Lisa Downing

The prominent place of corpuscularian mechanism in Locke's *Essay* is nowadays universally acknowledged.<sup>1</sup> Certainly, Locke's discussions of the primary/secondary quality distinction and of real essences cannot be understood without reference to the corpuscularian science of his day, which held that all macroscopic bodily phenomena should be explained in terms of the motions and impacts of submicroscopic particles, or corpuscles, each of which can be fully characterized in terms of a strictly limited range of (primary) properties: size, shape, motion (or mobility), and, perhaps, solidity or impenetrability.<sup>2</sup> Indeed, Locke's lists of primary quali-

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Earlier versions of some of this material were presented at the 1996 Pacific APA meetings in Seattle (with helpful comments from Lawrence Nolan), the first HOPOS (history of the philosophy of science) conference at Roanoke, the St. Andrews Conference on Late Medieval and Early Modern Corpuscular Matter Theory, and the Department of Philosophy at the University of Pennsylvania; I profited considerably from the discussions which followed. Thanks to Saul Fisher for useful e-mail discussions on mechanism. In addition, I am grateful to Gary Ebbs, Paul Guyer, Susan Sauvé Meyer, and Matthew Stuart for reading and commenting on an earlier version of this paper. Special thanks to Abraham Roth for more than one set of challenging comments. Comments from anonymous referees for *Philosophical Review* and from the editors improved the paper considerably. I gratefully acknowledge the support of the Dibner Institute for the History of Science and Technology during a period in which this paper was revised.

<sup>1</sup>Margaret Atherton, for example, notes that "it is close to becoming a contemporary orthodoxy that Locke's motive in writing the *Essay* was to provide a foundation or a defense for corpuscular mechanism" ("Corpuscles, Mechanism, and Essentialism in Locke," *Journal of the History of Philosophy* 29 (1991): 33). Maurice Mandelbaum might be regarded as having begun this trend towards emphasizing Locke's links with mechanism with his influential paper, "Locke's Realism," in *Philosophy, Science, and Sense Perception* (Baltimore: Johns Hopkins Press, 1964).

<sup>2</sup>Boyle also coined the term 'corpuscularianism'. For the purposes of this essay, I will use 'corpuscularianism' and 'mechanism' as interchangeable terms, defined as above. It may be worth noting that this is quite distinct from Michael Ayers's definition of mechanism as "the view that the laws of physics can be explained, in principle if not by us, by being deduced from the attributes possessed essentially by all bodies *qua* bodies; i.e., from the nature or essence of the uniform substance, matter, of which all bodies are composed" ("Mechanism, Superaddition, and the Proof of God's Existence in Locke's *Essay*," *Philosophical Review* 90 (1981): 210). Al-

ties are quite consistent with those found in the work of his friend Robert Boyle, a prominent defender of the corpuscularian program;<sup>3</sup> his real essences of substances appear to be corpuscular constitutions, arrangements of particles.

However, this acknowledgment of the role of mechanism in the *Essay* gives rise to some quite deep questions about the nature of Locke's project in the *Essay*. Is Locke's project a fully naturalistic one? Is he simply taking a developed corpuscularian theory as a starting point for his philosophizing? Such an interpretation of Locke has been defended by Peter Alexander, who reads Locke's *Essay* as an attempt to draw out the implications of Boylean mechanism and so to help confirm the theory.<sup>4</sup> While this interpretation makes good sense of Locke's corpuscularian excursions, I think it is to be resisted; it is an interpretation which, in my view, takes rather too literally Locke's famous claim to be an "Under-Labourer" in the service of the great natural philosophers of his day.<sup>5</sup> Locke clearly regards his inquiry into the understanding to be in some sense prior to natural philosophy:<sup>6</sup> Σημειωτικῆ (sēmeiōtikē) sets limits for φυσικῆ (physikē), rather than vice versa. Moreover, Locke consistently describes corpuscularianism as an *hypothesis* in natural philosophy, and in certain crucial passages he indicates

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though this is certainly a crucial doctrine to have in mind when discussing seventeenth-century natural philosophy (and Locke's philosophy in particular), it seems to me somewhat idiosyncratic to call it "mechanism."

<sup>3</sup>Although Locke, who highlights his disagreements with Descartes, emphasizes *solidity*, where Boyle, who wishes to play down the conflict between Cartesianism and atomism, speaks more neutrally of *impenetrability*.

<sup>4</sup>Peter Alexander, *Ideas, Qualities, and Corpuscles* (Cambridge: Cambridge University Press, 1985), 6–7. See also Peter Alexander, "Boyle and Locke on Primary and Secondary Qualities," in *Locke on Human Understanding*, ed. I. C. Tipton (Oxford: Oxford University Press, 1977), 70. Mandelbaum interprets Locke similarly. See *Philosophy, Science, and Sense Perception*, 1–3. Yolton's interpretation in *Locke and the Compass of Human Understanding* (Cambridge: Cambridge University Press, 1970), while importantly different, also takes corpuscularianism to be assumed by Locke as a starting point for the *Essay*; see p. 11.

<sup>5</sup>"Epistle to the Reader," *Essay*, 9–10. All references to Locke's *Essay* are to *An Essay concerning Human Understanding*, ed. Peter H. Niddich (Oxford: Oxford University Press, Clarendon Press, 1975). References to the body of the *Essay* are given by book, chapter, and section numbers.

<sup>6</sup>Here I agree with A. I. Davidson and N. Hornstein, "The Primary/Secondary Quality Distinction: Berkeley, Locke, and the Foundations of Corpuscularian Science," *Dialogue* 23 (1984): 281–303.

firmly that it is an hypothesis to which he is not officially committed, noting for example in 4.3.16 that it is not his “business to determine” “which ever Hypothesis be clearest and truest.”<sup>7</sup>

But if Locke is not simply taking corpuscularianism as a starting point, then the question of the status of mechanism in the *Essay* becomes extraordinarily pressing. What explains Locke’s invoking the corpuscularian hypothesis at crucial points in the *Essay*?<sup>8</sup> If the primary/secondary quality distinction is not simply drawn from corpuscularian theory, what *does* ground the distinction? Is Locke attempting to supply some sort of philosophical foundation for corpuscularianism in the *Essay*? If so, what sort and how so?

The question of the status of corpuscularianism in the *Essay* has not, of course, gone unnoticed in the literature, but neither has it been satisfactorily isolated and treated in detail.<sup>9</sup> In what follows, I address this question head on, beginning by taking a fresh look at the contexts in which Locke appears to invoke mechanism. I first briefly discuss Locke’s treatment of real essences, drawing a

<sup>7</sup>See also 4.3.11.

<sup>8</sup>This is a question that Michael Ayers leaves unanswered in *Locke* (Routledge: London, 1991), despite holding (rightly and insightfully, in my view) that Locke (i) is *not* a dogmatic exponent of Boylean corpuscularianism, (ii) is generally skeptical about knowledge of essences, including the essence of matter, yet (iii) appears to endorse Boyle’s hypothesis “virtually without qualification” when discussing the primary/secondary quality distinction (2:147). Some acknowledgment of the difficulty comes at 1:118, where Ayers notes: “The appearance of blowing both hot and cold for Boyle’s corpuscularianism and standard arguments for it can at first be puzzling. . . .” Ayers’s proffered explanation—that Locke holds that the arguments for corpuscularianism reveal its virtues but don’t demonstrate its truth—while in my view true, does not suffice to resolve the puzzle.

<sup>9</sup>Many commentators have held that Locke’s primary/secondary quality distinction is derived from mechanism, without committing themselves to a general position on Locke’s relationship to Boylean corpuscularianism; see, for example, E. M. Curley, “Locke, Boyle, and the Distinction between Primary and Secondary Qualities,” *Philosophical Review* 81 (1972): 438–64, and J. L. Mackie, *Problems from Locke* (Oxford: Oxford University Press, 1976), 23. Perhaps the best exception is Edwin McCann’s excellent recent article “Locke’s Philosophy of Body,” in *The Cambridge Companion to Locke*, ed. Vere Chappell (Cambridge: Cambridge University Press, 1994), 56–88. Although there are some areas of agreement between my treatment and McCann’s, there are important differences both in content and emphasis; McCann’s Locke is much more committed a corpuscularian than my Locke. Davidson and Hornstein also address this question directly in their 1977 paper; as will emerge, I think that there is something right but also something wrong about their answer.

quick moral for use in a more extended account of the primary/secondary quality distinction. What emerges from this complex discussion is a clearer understanding of the primary/secondary quality distinction, the status of mechanism for Locke, and, ultimately, the nature of Locke's philosophical project in the *Essay*.

### 1. Real Essences and Corpuscular Constitutions

In 3.3.15, in the course of his discussion of the signification of general terms, Locke officially introduces his distinction between real and nominal essences. For our purposes, what is crucial here is Locke's first characterization of the notion of real essence:

*First, Essence may be taken for the very being of any thing, whereby it is, what it is. And thus the real internal, but generally in Substances, unknown Constitution of Things, whereon their discoverable Qualities depend, may be called their Essence. This is the proper original signification of the Word, as is evident from the formation of it; Essentia, in its primary notation signifying properly Being. (3.3.15)*

This characterization of real essence is an abstract and metaphysical one: the real essence of something is its fundamental principle or constitution, the source of its other qualities, and, thus, what makes it the thing that it is. As Locke himself clearly acknowledges here, this is a more or less traditional notion of essence, akin to Aristotle's general notion of the essence of a thing.

However, despite the Aristotelian flavor of Locke's first characterization of real essence, he proceeds emphatically to distance himself from scholastic Aristotelianism as he understands it:

Concerning the real Essences of corporeal Substances, (to mention those only,) there are, if I mistake not, two Opinions. The one is of those, who using the Word *Essence*, for they know not what, suppose a certain number of those Essences, according to which, all natural things are made, and wherein they do exactly every one of them partake, and so become of this or that *Species*. The other, and more rational Opinion, is of those, who look on all natural Things to have a real, but unknown Constitution of their insensible Parts, from which flow those sensible Qualities, which serve us to distinguish them one from another, according as we have Occasion to rank them into sorts, under common Denominations. (3.3.17)

The structure, then, of 3.3.15–17 is as follows: In distinguishing real from nominal essences, Locke provides an abstract, metaphysical characterization of real essence as the foundation or source of

a thing's qualities, that which makes it the thing that it is. He proceeds to describe two hypotheses about what might actually fill this metaphysical role. One candidate is the scholastic notion of substantial form. According to this view, as Locke understands it, all members of a species "partake" in the same substantial form and it is this substantial form that makes them members of that species. The other candidate is the mechanist notion of corpuscular constitution. According to the corpuscular hypothesis, all of a thing's sensible qualities depend on the constitution or internal arrangements of its submicroscopic parts. The corpuscular constitution plays the role of a real essence in that it serves as the causal source and ultimate explanation of all of the thing's other qualities, and thus, is that which makes it the thing that it is.<sup>10,11</sup>

The status of mechanism in this particular section of the *Essay*, then, is perfectly clear: mechanism provides an example of what might fill a certain metaphysical role (and a hypothesis about what does fill it). Indeed, it seems that Locke presents a corpuscular account of real essences primarily as a sort of illustration or model to help clarify the somewhat obscure notion of a substance's fundamental principle or constitution. Thus, while Locke does invoke the corpuscularian theory developed by Boyle, it is clear that he is not here taking it as a starting point but is rather making use of it in order to clarify his conception of real essence.

But is corpuscular theory a *mere* illustration? This question is tied to the question of why Locke characterizes the mechanist conception of real essences as the "more rational Opinion." What is the basis for Locke's claims about the superiority of the corpuscular hypothesis? This will prove to be a crucial issue for determining

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<sup>10</sup>As Locke makes clear in 3.6.6, however, if by "thing that it is" we mean thing of a certain kind, then the real essence must be relative to the nominal one—for example, the real essence of gold would be that combination of the primary qualities of the corpuscular constituents of gold which is causally responsible for its having the observable properties (yellow color, malleability, etc.) which we have made the nominal essence of gold. See Paul Guyer, "Locke's Philosophy of Language," in Chappell, *Cambridge Companion to Locke*, 133–34, and David Owen, "Locke on Real Essence," *History of Philosophy Quarterly* 8 (1991): 105–18.

<sup>11</sup>Of course it provides only a partial explanation of a body's secondary and tertiary qualities, since the explanation must also refer to the constitution of the sensory organs in the case of secondary qualities or to the constitution of the affected body in the case of tertiary qualities.

the status of mechanism for Locke. However, he provides us with little to go on in 3.3.15–17; certainly Locke is not attempting *here* to provide a real philosophical foundation for mechanism. Locke's most significant remark in this regard is that the Aristotelians use the word essence for "they know not what." In Locke's view the corpuscularians are able to characterize real essences, whereas the Aristotelians are not.<sup>12</sup> This characterization, of course, will only be in general terms, for the corpuscular constitutions of particular bodies remain undiscovered. This is why Locke employs the phrase "real, but unknown Constitution." Nevertheless, the corpuscularian can describe the sort of thing a real essence is in intelligible terms drawn from our experience of macroscopic objects. Locke's contrast here between scholastic and corpuscularian accounts of forms or essences parallels Boyle's remarks about the excellency of the corpuscular hypothesis:

The first thing, that I shall mention to this purpose [that is, recommending the corpuscular philosophy], is the intelligibleness or clearness of mechanical principles and explications. I need not tell you, that among the Peripateticks, the disputes are many and intricate about matter, privation, substantial forms, and their eduction, &c. . . . But to come now to the corpuscular philosophy, men do so easily understand one another's meaning, when they talk of local motion, rest, bigness, shape, order, situation, and contexture of material substances; and these principles do afford such clear accounts of those things, that are rightly deduced from them only, that even those Peripateticks or chymists, that maintain other principles, acquiesce in the explications made by these, when they can be had, and seek not any further.<sup>13</sup>

The intelligibility of corpuscular constitutions is what leads Locke to single them out as exemplars of the metaphysical notion of real essences. Does this special intelligibility somehow render mechanism more than a mere example or illustration? To answer this question we must examine Locke's much more complex use of mechanism in his discussion of the primary/secondary quality distinction.

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<sup>12</sup>He also contends that the Aristotelian theory of real essences is confronted with empirical counterexamples: "Monsters" and "Changelings."

<sup>13</sup>Robert Boyle, "About the Excellency and Grounds of the Mechanical Hypothesis," *The Works of the Honourable Robert Boyle* (London: Birch, 1772), 4:69.

## 2. Mechanism and the Primary/Secondary Quality Distinction

Given this reading of Locke's use of mechanism in his discussion of real essences, a parallel hypothesis about how to interpret his primary/secondary quality distinction leaps to mind. Perhaps here also Locke is primarily interested in making a metaphysical distinction between two kinds of qualities, with mechanism invoked as an illustrative example.

The validity of this sort of interpretation seems to be confirmed by a key passage towards the end of 2.8:

I have in what just goes before, been engaged in Physical Enquiries a little farther than, perhaps, I intended. But it being necessary, to make the Nature of Sensation a little understood, and to make the *difference between the Qualities in Bodies, and the Ideas produced by them in the Mind*, to be distinctly conceived, without which it were impossible to discourse intelligibly of them; I hope, I shall be pardoned this little Excursion into Natural Philosophy, it being necessary in our present Enquiry, to distinguish the *primary*, and *real Qualities* of Bodies, which are always in them, (*viz.* Solidity, Extension, Figure, Number, and Motion, or Rest; and are sometimes perceived by us, *viz.* when the Bodies they are in, are big enough singly to be discerned) from those *secondary* and *imputed Qualities*, which are but the Powers of several Combinations of those primary ones, when they operate, without being distinctly discerned; whereby we also may come to know what *Ideas* are, and what are not Resemblances of something really existing in the Bodies, we denominate from them. (2.8.22)

Locke apologizes here for his lengthy corpuscularian "digression," but justifies it as necessary in order to make two crucial distinctions understood. The first is the distinction between "*Ideas or Perceptions in our Minds*" (2.8.7) and the causes of those ideas, qualities, or powers in bodies. He uses mechanism as a quick way of justifying the claim that this distinction must be made:

These [ideas vs. bodily causes] are two very different things, and carefully to be distinguished; it being one thing to perceive, and know the *Idea* of White or Black, and quite another to examine what kind of particles they must be, and how ranged in the Superficies, to make any Object appear White or Black. (2.8.2)

This distinction is a necessary preliminary to the primary/secondary quality distinction, which is a distinction between two kinds of *qualities*, namely, those which "*are really in them*, whether any ones Senses perceive them or no" (2.8.17) and are therefore primary,



versus those which are “*imputed*” (2.8.22) and “nothing in the Objects themselves, but Powers” (2.8.10) and are therefore secondary.

The nature of this latter distinction, despite Locke’s many different attempts to clarify it, is far from obvious. I suggest that Locke is attempting to motivate a metaphysical distinction in 2.8, and that he does so as follows: First, as noted above, Locke alerts us to the distinction between ideas or perceptions, which are in some sense “in” our minds, and their causes, which are “in” external objects or bodies. Making this distinction raises the question of how well our ideas represent their bodily causes. At this point Locke presents the following metaphysical picture: External objects or bodies must possess some intrinsic and irreducible qualities, that is, properties which do not depend on an object’s relations to other things and which are not causally derived from other, more basic, properties. We can thus distinguish between these primary and foundational qualities and other qualities or powers which are ultimately reducible to them. Locke assumes, further, that matter is catholic, that is, the same types of qualities are intrinsic and irreducible in all bodies.<sup>14</sup> Consider then the set of effects singled out earlier, namely, ideas. Some of these ideas may accurately represent—or “resemble,” in Locke’s terminology—the primary or intrinsic qualities of bodies.<sup>15</sup> However, they need not. The idea in

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<sup>14</sup>By ‘qualities’ in what follows, I will typically mean particular quality instances—for example, the round shape of a corpuscle of water, the redness of my sweater. This is in accord with the good Lockean dictum that everything that exists is particular. I will use ‘quality type’ to designate size, shape, color, etc., in general. (There is of course an intermediate level of generality—redness, squareness, bitterness, etc.—but for present purposes we do not need a special term for it.) Locke uses ‘quality’ in at least the first two senses, but the official introduction of ‘quality’ in 2.8.8 gives it the first sense.

<sup>15</sup>Locke holds that an idea resembles a corporeal quality if and only if the idea gives us an accurate conception of a type of quality, as it exists in bodies themselves. Thus, supposing the corpuscularian hypothesis to be true, our ideas of particular figures are resembling, because corpuscularianism attributes shape, as we conceive of it based on ordinary experience, to the ultimate constituents of bodies. Thus, my idea of a cone would be resembling, even if no ultimate particles are cone-shaped, because the idea gives me an accurate conception of the sort of spatial properties which are had by those particles (and an accurate conception, presumably, of a particular property, cone-shapedness, which *could* be had by them). Our ideas of color are non-resembling, however, since our experience misleads us as to the way in which color exists in objects. Our color ideas suggest that colors exist as simple intrinsic properties spread out over the surfaces of

question, and the corresponding power, may derive merely from some particular combination of primary qualities which the resulting idea does not accurately represent. Those powers to produce sensory ideas whose ideas do not resemble any intrinsic properties of bodies are the ones that Locke singles out for special attention as secondary qualities.

This distinction is complex. At its core, however, is a simple distinction between the (primary) intrinsic, fundamental properties of bodies, versus the (secondary) qualities (powers) that result from (and are reducible to) those properties.<sup>16</sup> This doesn't yet fully capture *Locke's* primary/secondary quality distinction, however. All observable, macroscopic qualities of bodies, the qualities that correspond one-to-one with ideas, are *powers*, as Locke specifically indicates at 2.8.8.<sup>17</sup> The question of which of the observable qualities (if any) are primary is for Locke the question of which of those qualities are more than *mere* powers, that is, which correspond to ideas which provide us with an accurate conception of the way bodies are in themselves. Locke appeals here to his notion of resemblance.<sup>18</sup> Some of our ideas of bodies may "resemble" or accurately represent the real, intrinsic properties of bodies. More specifically, some of our ideas may give us an accurate conception

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the objects, but colors in objects are in fact (again, supposing corpuscularianism to be true) mere powers causally derived from complex surface structures, and no color is attributed to the ultimate constituents of bodies. I do not suppose that this gloss is entirely original nor that it solves all the problems which can be raised about Locke's notion of resemblance, but further elucidation lies beyond the scope of this paper. For a brief but interesting discussion of Locke on resemblance, see Kenneth Winkler, "Ideas, Sentiments, and Qualities," *Minds, Ideas, and Objects*, ed. Phillip D. Cummins and Günter Zöllner, North American Kant Society Studies in Philosophy, vol. 2 (Atascadero, Calif.: Ridgeview, 1992), 154–56.

<sup>16</sup>In this general sense, powers to produce observable changes in other objects (what Locke scholars call "tertiary qualities") would count as secondary qualities. This fits with the fact that at one point (2.8.26) Locke labels them "Secondary Qualities, mediately perceivable."

<sup>17</sup>Thanks to Alan Gabbey for forcing me to pay attention to this. The point that all macroscopic qualities are powers is an important one for Locke, since it is central to his case for the adequacy of all our simple ideas (see 2.23.1). Thus, although this passage is sometimes discounted, it ought not be, since the position does theoretical work for Locke.

<sup>18</sup>In holding that it is Locke's notion of resemblance that is the basis for his distinction between primary quality powers and secondary quality powers (that is, macroscopic primary and secondary qualities), I agree with Curley, "Locke, Boyle, and the Distinction," 450–51.

of the types of properties intrinsic to bodies. Those qualities corresponding to those “resembling” ideas count as primary qualities, those which do not are secondary. Thus, both the intrinsic, irreducible properties of bodies (which might belong only to submicroscopic parts, and so be unobservable) *and* those macroscopic qualities or powers (which might themselves be reducible) that provide us with an accurate conception of the intrinsic, irreducible properties count as primary qualities.

Like Locke, I find that a corpuscularian example helps to clarify these notions. A snowball produces an idea of roundness and whiteness in me; the snowball possesses a power to produce each idea. Supposing that the corpuscularian hypothesis is true, both powers causally derive from a certain arrangement of certain sorts of particles. That is, our ability to perceive both macroscopic color and shape depends on the way particles of light reflect off of corpuscular surface structures:

After the same manner, that the *Ideas* of these original Qualities are produced in us, we may conceive, that the *Ideas of secondary Qualities* are also *produced*, viz. *by the operation of insensible particles on our Senses.* (2.8.13)

The crucial difference between roundness and whiteness here is that one sort of idea provides us with an accurate conception of the way bodies are in themselves, while the other does not. Both individual corpuscles and their arrangements have shape, that is to say, shape cannot be left out of an explanation of why a snowball looks round, while color can be left out of an explanation of why it looks white.<sup>19</sup> To put it another way, corpuscular theory attributes size, shape, motion, etc., as we conceive of them based on macroscopic sensory experience, to the ultimate constituents of body, but it does not do the same with color.<sup>20</sup> Thus, color counts as a secondary quality.

The category of primary quality is thus a disjunctive one. A particular quality is a primary quality if and only if it is an intrinsic,

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<sup>19</sup>Bracketing the general problem, in principle, of explaining how bodies cause ideas.

<sup>20</sup>Since the yellowness of a lemon is not, as it appears to be, a simple intrinsic quality uniformly spread out over its surface, and, moreover, *nothing* is yellow in that way. Rather, yellowness merely consists in a power to affect perceivers in a certain way, a power derived from a complex structure in no way reflected in the simple idea of yellow.

irreducible quality of body or its idea is representative of a type of quality that is intrinsic and irreducible in bodies.<sup>21</sup> If corpuscularianism were true, the (say) globular shape of a certain corpuscle would thus be a primary quality under the first disjunct (but not under the second disjunct, since the globular shape by itself produces no ideas). The round shape of the snowball would count as a primary quality under the second disjunct, since its idea, by representing roundness, represents a type of quality which is intrinsic and irreducible in bodies—namely, shape.<sup>22</sup> This disjunctiveness is implicit in 2.8, for Locke often (for example, 2.8.10, 2.8.26, 2.8.17) treats only the fundamental qualities of the parts of bodies under

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<sup>21</sup>Here is another way to put the same point: There are, in effect, two distinct notions of quality being employed by Locke. Qualities<sub>1</sub> are real, intrinsic, irreducible properties of bodies. All qualities<sub>1</sub> are primary qualities. Qualities<sub>2</sub> are powers to produce ideas, either directly, or indirectly (via producing a change in a different object). Tertiary qualities are qualities<sub>2</sub> that are powers to produce ideas indirectly, by producing a change in a different object. The remaining qualities<sub>2</sub> get divided into primary versus secondary based on the notion of resemblance. A primary quality<sub>2</sub> is a power to produce an idea directly whose resulting idea “resembles” or gives us an accurate conception of a type of property that is intrinsic and irreducible in bodies. (A secondary quality is a power to produce an idea directly which is not a primary quality<sub>2</sub>.) Locke’s general notion of primary quality can then be stated as follows: something is a primary quality if and only if it is a quality<sub>1</sub> or a primary quality<sub>2</sub>. (I borrow the use of subscripts to distinguish between qualities as properties and qualities as powers from Samuel C. Rickless’s recent paper, “Locke on Primary and Secondary Qualities,” *Pacific Philosophical Quarterly* 78 (1997): 297–319. Although my mode of presentation here is influenced by Rickless, our interpretations are very different.)

The criterion given above for being a primary quality<sub>2</sub> is fairly liberal. One might impose a stricter criterion, according to which a power qualifies as primary if and only if its idea resembles a single intrinsic and irreducible property that is its causal basis. Under the strict criterion, however, it would be less than clear whether instances of macroscopic shape and solidity (on the corpuscularian view) should count as primary qualities, since instances of macroscopic shape and solidity are, arguably, causally derived from and reducible to more basic properties, namely, the size, shape, arrangement, motion, etc. of corpuscles. My interpretation is agnostic about this latter issue. Interestingly, Locke’s claim in 2.23.22–23 that we do not understand macroscopic extension, because (on the corpuscularian account) it amounts to the cohesion of solid parts and we lack an understanding of cohesion, suggests that he thinks it is a goal of corpuscularianism to provide a causally reductive account of macroscopic shape, even if the reduction cannot actually be carried out.

<sup>22</sup>It might not qualify under the first disjunct, since, arguably, it would simply be a power reducible to more fundamental qualities.

the rubric of primary qualities; in 2.8.23, when he treats microscopic primary qualities together with macroscopic ones, he first lists the fundamental qualities of the parts and then alludes to the macroscopic primaries. The disjunctiveness drops out at the level of quality-types—the sorts of qualities that are intrinsic to bodies are the primary qualities, those that aren't are secondary.<sup>23</sup> According to corpuscularianism, size, shape, motion, and solidity are in the first category, while taste, color, smell, etc. are in the second. In what follows, I will sometimes neglect the second disjunct—that is, macroscopic primary qualities—as Locke himself sometimes does, for the sake of simplicity.

We can distinguish, then, between the primary qualities of bodies, which are the ultimate source of all of a body's causal powers, and their secondary qualities, which are “imputed” or “merely apparent” in the following sense: they are powers which depend for their existence on the primary qualities of bodies and for their individuation on the faculties of certain kinds of perceivers. It is this dependence that Locke is stressing in such infamous passages as 2.8.17:

*Light, Heat, Whiteness, or Coldness, are no more really in them, than Sickness or Pain is in Manna. Take away the Sensation of them; let not the Eyes see Light, or Colours, nor the Ears hear Sounds; let the Palate not Taste, nor the Nose Smell, and all Colours, Tastes, Odors, and Sounds, as they are such particular Ideas, vanish and cease, and are reduced to their Causes, i.e. Bulk, Figure, and Motion of Parts.*

Of course these secondary qualities as *powers* (powers to produce ideas in certain sorts of perceivers, grounded in combinations of primary qualities) would not cease to exist in the absence of smelling noses and tasting palates, but they would be irrelevant; the only reason for singling them out from the myriad potentialities of bodies is that these powers are actualized and we take effects on the human senses to be particularly significant; they are, moreover, singled out in terms of those sensory effects. That is, the secondary quality of X-ness is simply the power to produce the idea of X; the secondary quality's causal basis is whatever combination of primary qualities it takes to produce an idea of X. Primary qualities, by

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<sup>23</sup>Disjunctiveness may reappear, though, when we explain, for example, what makes the snowball's shape count as being of the same sort as the shape of a corpuscle.

contrast, are not dependent on any other more fundamental qualities, and, because they are intrinsic and irreducible, their individuation is not merely in terms of their sensory effects.<sup>24</sup> That is, the primary qualities themselves need not be similarly analyzed as whatever constitution causes our experience of X because X-ness belongs to bodies as they are in themselves. This is the contrast that Locke is making by stressing that secondary qualities are powers, *mere* powers, and nothing in bodies but powers, as opposed to the primary and real qualities of bodies.

With this interpretation of the primary/secondary quality distinction in place, it seems clear that corpuscularianism can again be regarded as simply playing the role for Locke of a particularly good exemplar of the metaphysical distinction he wishes to make.<sup>25</sup> Taking the sorts of primary qualities of bodies to be bulk, figure, number, situation, motion/rest, and solidity, we can suppose that other qualities of bodies might be reducible to these. By this hypothesis, we can regard a secondary quality as:

The *Power* that is in any Body, by Reason of its insensible *primary Qualities*, to operate after a peculiar manner on any of our Senses, and thereby *produce in us* the *different Ideas* of several Colours, Sounds, Smells, Tasts, etc. (2.8.23)

Corpuscularianism thus provides us with an understanding of the dependence of secondary qualities on primary ones:<sup>26</sup>

But if the Sensation of Heat and Cold, be nothing but the increase or diminution of the motion of the minute Parts of our Bodies, caused by the Corpuscles of any other Body, it is easie to be understood, That if that motion be greater in one Hand, than in the other; if a Body be applied to the two Hands, which has in its minute Particles a greater motion, than in those of one of the Hands, and a less, than in those of the other, it will increase the motion of the one Hand, and lessen it in the other, and so cause the different Sensations of Heat and Cold, that depend thereon. (2.8.21)

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<sup>24</sup>Which is not, of course, to say that we might not need sensory experience in order to say anything about these primary qualities.

<sup>25</sup>Here I disagree with McCann, who sees Locke's primary/secondary quality distinction as identical with the corpuscularian distinction, although in his view Locke justifies this distinction by appeal to our ordinary notion of body, rather than by appeal to Boyle's authority or to the success of corpuscularianism ("Locke's Philosophy of Body," 60–61).

<sup>26</sup>Although, as detailed below, it is an understanding that is crucially limited.

It is no coincidence, in my view, that mechanism is called upon to illustrate both real essence and the contrast between primary and secondary qualities, since real essence and primary quality are logically connected notions.<sup>27</sup> The primary qualities of a body are the intrinsic and irreducible properties which ground all its other powers. The real essence of a substance is the source of its observable qualities, that which makes it the thing that it is. The real essence of a body of a certain kind, X, is thus constituted by that combination of the primary qualities of its constituents which is the causal source of those qualities according to which we classify it as an X. Thus, an hypothesis about what the *primary qualities* of bodies *are* is an hypothesis about what the *real essences* of bodies *are like*, since it is an hypothesis about what the parameters are in terms of which real essences must be characterized. Both notions are metaphysical notions in the sense that they are more general than any notion employed by any particular physical theory and they are not dependent for their justification on any particular physical theory; rather, particular physical theories must be conformable to them.

To say that any physical theory must conform to the prior metaphysical notions of primary quality and real essence is just to say that a physical theory, for Locke, must tell us what the intrinsic qualities of bodies are.<sup>28</sup> It doesn't otherwise constrain the content of the theory.<sup>29</sup> For example, it remains possible that bodies might have no secondary qualities at all (so that all of their observable qualities are primary ones) or that all of their observable properties might be secondary. Corpuscularianism, because of its "resemblance" thesis, lies in between these two extremes.<sup>30</sup> Thus, the

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<sup>27</sup>Textual evidence that Locke *sees* this connection is provided by passages such as 4.6.7: "we know not the real Constitutions of Substances, on which each *secondary Quality* particularly depends." 'Real constitution' is systematically used by Locke as synonymous with 'real essence'. He says here, then, that secondary qualities depend on real essences. But, of course, Locke usually describes secondary qualities as depending on *primary qualities*. This highlights the logical relationship between these two notions.

<sup>28</sup>More precisely, as discussed below, it must do so to the extent that it is intended to be a "natural philosophy from the first principles of bodies."

<sup>29</sup>Except, as noted above, by assuming that all bodies have the same sorts of fundamental qualities.

<sup>30</sup>A related point is made by Michael Ayers; see *Locke*, 1:184.

metaphysics presupposed by Locke here is simply an elaboration of the following collection of theses:

- (1) There is a way the world is.
- (2) There is a way the world appears to be.
- (3) The former has a causal influence on the latter.
- (4) The latter may well diverge from the former.

It is clear that part of Locke's goal in elaborating the primary/secondary quality distinction is to highlight (4), the possibility that the way the world appears to us diverges from the way it is. That this is in some sense the moral of 2.8 is supported by the seldom-noted fact that Locke opens the chapter by inviting us to consider the possibility of positive ideas from privative causes,<sup>31</sup> that is, the possibility that qualities which our ideas represent as positive (for example, cold) are in objects mere privations (for example, the absence of heat or motion).<sup>32</sup> Similarly, in the penultimate section of the chapter, Locke chides us for being "apt to imagine, that our *Ideas* are resemblances of something in the Objects" (2.8.25). This is, of course, in keeping with Locke's overall aim of encouraging epistemic modesty.

It seems, then, that we have arrived at a clear, consistent, and perhaps attractive interpretation of the status of mechanism for Locke. According to Locke, mechanism provides a particularly good illustration of what the real essences of bodies might be like, what the primary qualities of bodies might be, and how their secondary qualities might depend upon them. Thus, while he invokes Boylean corpuscularianism directly, as a developed scientific theory, he considers it just one hypothesis about the nature of bodies, albeit one that is particularly useful for his purposes. The interpretation thus acknowledges the obvious presence of corpuscularianism in the *Essay*, without viewing Locke as simply adopting the theory from natural philosophers and taking it as a starting point for philosophizing. It thereby does justice to passages such as

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<sup>31</sup>Margaret Atherton does, however, utilize this fact in her interpretation of Locke's primary/secondary quality distinction. Margaret Atherton, "'Ideas in the Mind, Qualities in Bodies': Some Distinctive Features of Locke's Account of Primary and Secondary Qualities," in Cummins and Zöller, *Minds, Ideas, and Objects*, 120.

<sup>32</sup>My example is Cartesian, for it seems clear that Descartes's Third Meditation discussion of materially false ideas influences Locke's account here.



4.3.16, 4.3.11, and 2.8.22, where Locke explicitly distances himself from the corpuscularian hypothesis. In these passages, it seems that Locke provides us with guidance as to how to interpret his extended development of the corpuscularian version of the primary/secondary quality distinction in 2.8. Locke indicates that corpuscularianism provides the most intelligible account of the nature of bodies, and the clearest illustration of the primary/secondary quality distinction, but its official role in the *Essay* is just that of an “instance” or example, rather than a starting point.

### 3. The Conceptual and Sensory Criteria and the Special Intelligibility of Mechanism

This interpretation, despite its attractive simplicity, cannot be quite complete, however. To see why not, we must examine 2.8.9, where Locke first describes the primary/secondary quality distinction:

Qualities thus considered in Bodies are, First such as are utterly inseparable from the Body, in what estate soever it be; such as in all the alterations and changes it suffers, all the force can be used upon it, it constantly keeps; and such as Sense constantly finds in every particle of Matter, which has bulk enough to be perceived, and the Mind finds inseparable from every particle of Matter, though less than to make it self singly be perceived by our Senses. *u.g.* Take a grain of Wheat, divide it into two parts, each part has still *Solidity, Extension, Figure, and Mobility*; divide it again, and it retains still the same qualities; and so divide it on, till the parts become insensible, they must retain still each of them all those qualities. For division (which is all that a Mill, or Pestel, or any other Body, does upon another, in reducing it to insensible parts) can never take away either *Solidity, Extension, Figure, or Mobility* from any Body, but only makes two, or more distinct separate masses of Matter, of that which was but one before, all which distinct masses, reckon'd as so many distinct Bodies, after division make a certain Number. These I call *original or primary Qualities* of Body, which I think we may observe to produce simple *Ideas* in us, *viz.* *Solidity, Extension, Figure, Motion, or Rest, and Number.*<sup>33</sup>

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<sup>33</sup>This quotation is from the fourth edition (1700) of the *Essay*. It is important to note that 2.8.9 reads differently in the earlier editions of the *Essay* (1690, 1694, 1695); in particular, in those editions the first introduction of the term ‘primary quality’ is through a corpuscularian list. Thus, the interpretation given here applies most directly to the fourth and fifth editions (1700 and 1706), the fourth edition being the last fully supervised by Locke himself, and now standard. The view I attribute to Locke here is, I believe, visible in earlier editions as well, but in a somewhat more confused fashion; that is, there are strong tensions in the earlier editions

Here Locke seems to be supplying *criteria* for identifying the primary qualities of bodies, criteria which single out the corpuscularian primary quality-types of solidity, extension, figure and mobility. This passage, then, suggests that Locke does not simply invoke mechanism as an example; rather, it seems that he undertakes to provide philosophical *foundations* for mechanism. Clearly, any account of the status of mechanism for Locke must confront the implications of this passage.

Locke's first characterization of primary qualities in 2.8.9, as "utterly inseparable from the Body," is unproblematic from the perspective of the interpretation defended thus far; it is an abstract characterization of a piece with his fundamental characterization of primary qualities as intrinsic, irreducible qualities of bodies.<sup>34</sup> In the remainder of the paragraph, however, Locke makes two crucial claims: First, the primary qualities of bodies are those that we constantly find in our sensory experience of bodies; they are "such as Sense constantly finds in every particle of Matter, which has bulk enough to be perceived". Second, the primary qualities of bodies are those that "the Mind finds inseparable from every particle of Matter," that is, those without which bodies cannot be conceived of as bodies.<sup>35</sup> In what follows, I call the first claim the sensory criterion, the second, the conceptual criterion. The thought experiment with the particle of wheat, then, seems to illustrate the workings of the conceptual criterion in that it suggests how a certain kind of conceptual consideration can allow us to determine what qualities must be attributed to bodies below the level of sensation.

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which are considerably reduced by the fourth edition revisions. The status of corpuscularianism in Locke's thought undergoes considerable development over the course of his career, which can be seen, in part, in the three extant drafts of the *Essay*. I cannot treat that development here, but I do so in detail in Downing, "Locke: Corpuscularianism and Scientia, Newtonianism and Experimental Philosophy," chapter 2 in *Empiricism and Newtonianism*, in progress.

<sup>34</sup>But the connection between inseparability (or essentiality) and intrinsicity-and-irreducibility is worth puzzling over. Locke's thought is presumably this: Because the primary qualities of bodies are intrinsic and irreducible, they cannot be destroyed, since the destruction of a quality can only be explained in terms of the disintegration of some combination of more fundamental qualities giving rise to it.

<sup>35</sup>Here I agree with Davidson and Hornstein, "The Primary/Secondary Quality Distinction," 285.

The crucial question confronting us, however, is this: What exactly are these criteria supposed to *do*, according to Locke? Does he suppose that the sensory criterion allows us to determine the intrinsic, irreducible, essential qualities of bodies? Surely not. Locke's brand of empiricism is far too modest.<sup>36</sup> As he tells us at 2.13.24, "our Senses . . . are scarce acute enough to look into the pure Essences of Things." Does he suppose that the conceptual criterion allows us to determine the intrinsic, irreducible, essential qualities of bodies? Again, surely not. Locke, of course, does not hold that we have an intellectual faculty for detecting essences, and some such claim would be required in order to justify the leap from an epistemological premise to this metaphysical conclusion.<sup>37</sup> He is, moreover, overtly hostile to Cartesian efforts in this direction.<sup>38</sup> But if these criteria are not, as the structure of 2.8.9 might suggest, simply given as a way to determine what the primary qualities of bodies *are*, then what are they *for*?

Recalling our discussion of Locke on real essences, we may suppose that what is at stake here is the special intelligibility of mechanism. Again it will be helpful to look at some of Robert Boyle's claims on this subject:

They, that, to solve the phaenomena of nature, have recourse to agents, which, though they involve no self-repugnancy in their very notions, as many of the judicious think substantial forms and real qualities to do, yet are such, that we conceive not, how they operate to bring effects to pass: these, I say, when they tell us of such indeterminate agents, as the soul of the world, the universal spirit, the plastic power, and the like; though they may in certain cases tell us some things, yet they tell us nothing, that will satisfy the curiosity of an inquisitive person, who seeks not so much to know, what is the general agent, that produces a phaenomenon, as, by what means, and after what manner, the phaenomenon is produced.<sup>39</sup>

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<sup>36</sup>Here I depart from Davidson and Hornstein, who argue that Locke sought to justify a corpuscularian primary/secondary quality distinction via the sensory and conceptual criteria. To the extent that they hold that Locke intended these criteria to establish the presumptive truth of corpuscularianism (and it appears to me that they do), our interpretations are strongly in conflict. If, on the other hand, they mean something weaker by 'justify', then I offer a different account of the nature of that justification.

<sup>37</sup>As Gary Hatfield observes in *The Natural and the Normative* (Cambridge: M.I.T. Press, 1990), 57.

<sup>38</sup>See 2.13.24–25.

<sup>39</sup>Boyle, "Excellency of the Mechanical Hypothesis," *Works*, 4:72.

From the foregoing discourse it may (probably at least) result, that if, besides rational souls, there are any immaterial substances (such as the heavenly intelligences, and the substantial forms of the Aristotelians,) that regularly are to be numbered among natural agents, their way of working being unknown to us, they can but help to constitute and effect things, but will very little help us to conceive how things are effected; so that by whatever principles natural things be constituted, it is by the mechanical principles, that their phænomena must be clearly explicated.<sup>40</sup>

Boyle, it seems, wants to claim not only that mechanism is especially intelligible, but that it is *uniquely* so. Corpuscularianism, he maintains, is “the only Hypothesis tht Can explicate the *Phaenomena*, or at lest tht does explicate them so well.”<sup>41</sup> It is not always easy to see, however, why exactly he holds this to be the case. The unique explanatory power of mechanism clearly has something to do with, on the one hand, its basic concepts being familiar, simple, and clear, and with, on the other hand, its purportedly explaining *how* natural changes take place in a way unmatched (and perhaps unmatchable) by its competitors.

I will argue that Locke accords a closely related status to the corpuscular hypothesis. In particular, Boyle’s ringing declaration, “by whatever principles natural things be constituted, it is by the mechanical principles, that their phænomena must be clearly explicated” provides a neat first approximation of Locke’s philosophical attitude toward mechanism. As we shall see, however, Locke draws a somewhat different moral from this thought than Boyle had.

Like Boyle, then, Locke regards corpuscularianism as an hypothesis, but as an especially intelligible hypothesis, and, in just that sense, more than a *mere* hypothesis. In addition, Locke provides explicit philosophical foundations for his stance towards mechanism. And this is precisely what Locke is concerned with in 2.8.9. The sensory and conceptual criteria highlight the special intelligibility and unique status of mechanism.

In order to see how they do so, we must recall Locke’s views on the nature of knowledge, science, and scientific explanation. To

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<sup>40</sup>Ibid., 76.

<sup>41</sup>Boyle, “MS Notes on a Good and an Excellent Hypothesis,” *Selected Philosophical Papers of Robert Boyle*, ed. M. A. Stewart (Indianapolis: Hackett, 1991), 119.

achieve what he variously calls “*scientific*” “*Philosophy in physical Things*” (4.3.26), “philosophical *Knowledge* of . . . Bodies” (4.3.29), or “*Natural Philosophy* from the first Principles of Bodies in general,”<sup>42</sup> we would need, according to Locke, to be able to discover “the necessary Connexion, and *Co-existence*, of the Powers” (4.3.16) of bodies. Properly scientific knowledge or *scientia* is knowledge of necessary connection. To explain some quality of a body is to show how it flows from the body’s real essence in the same way that the properties of a triangle follow from its definition.<sup>43</sup> Thus, for a theory to provide scientific explanation, it must provide us with a clear conception of what the real essences of bodies are, and then show us how other sensible qualities might flow from that essence. This requires, first, that the theory, in its description of real essences, utilize clear empirical concepts. That corpuscularianism does so is precisely what Locke is pointing out in giving the sensory criterion for primary qualities. The sensory criterion highlights the fact that corpuscularian concepts—size, shape, motion, solidity, situation, etc.—are clear, empirical concepts, drawn straight from our sensory experience of bodies. Of course, the obvious contrast here is with scholastic theories; Boyle and Locke both hold that the notion of substantial form, central to Aristotelian theorizing, lacks empirical content. The scholastics, they hold, use terms such as ‘essence’ and ‘substantial form’ for they know not what; they use words without ideas. Because of this, scholasticism fails to provide scientific explanation; we can’t grasp the scholastic notion of real essence nor understand what follows from it. As Boyle puts it:

I do not remember that either Aristotle himself (who perhaps scarce ever attempted it) or any of his followers, has given a solid and intel-

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<sup>42</sup>John Locke, *Some Thoughts Concerning Education*, ed. John W. Yolton and Jean S. Yolton (Oxford: Oxford University Press, Clarendon Press, 1989), 248 (§194).

<sup>43</sup>See 2.31.6:

The complex *Ideas* we have of Substances, are, as it has been shewn, certain Collections of simple *Ideas*, that have been observed or supposed constantly to exist together. But such a complex *Idea* cannot be the real Essence of any Substance; for then the Properties we discover in that Body, would depend on that complex *Idea*, and be deducible from it, and their necessary connexion with it be known; as all Properties of a Triangle depend on, and as far as they are discoverable, are deducible from the complex *Idea* of three Lines, including a Space.

See also 3.11.22.

ligible solution of any one phaenomenon of nature by the help of substantial forms; which you need not think it strange I should say, since the greatest patrons of forms acknowledging their nature to be unknown to us, to explain any effect by a substantial form, must be to declare (as they speak) *ignotum per ignotius*, or at least *per aequè ignotum*.<sup>44</sup>

Secondly, the theory has to model the “flow” of property from essence, or, as Boyle might have put it, it has to explain *how*. The corpuscularian primary qualities and the associated notion of impulse provide mechanism with the potential to do this. Mechanism’s apparent ability to model the flow of property from essence is rendered perspicuous by means of the lock and key analogy. For example, Locke suggests that if we knew the corpuscularian real essences of opium and human being, we would understand why opium has its famous dormitive power in the same way that we understand why a certain key has the power to turn a certain lock. Moreover, we would be able to assert “without Trial” that opium can put humans to sleep (4.3.25).

Corpuscularianism, then, employs clear empirical concepts and allows us to model the flow of property from essence. These virtues do not, however, seem to fully account for the fact that Locke regards the theory as in some sense *uniquely* intelligible. The uniqueness of corpuscularianism is best summed up by the observation that corpuscularianism asserts that the real essence of body corresponds to the nominal essence we assign to “body.”<sup>45</sup> The

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<sup>44</sup>Boyle, “The Origin of Forms and Qualities,” *Works*, 3:46.

<sup>45</sup>Here one might raise the following worry for the interpretation under construction: If corpuscularianism is true, our idea of body is adequate. But Locke appears to contend that all our ideas of substances are inadequate. Body is a substance. It would then follow that Locke ought to hold that corpuscularianism *cannot* be true. But it would be odd to hold up a demonstrably false theory as a paragon of intelligibility, at least without more in the way of explicit caveats. The following three points suffice to resolve this difficulty: (1) Clearly, Locke does not actually hold that corpuscularianism *cannot* be true; rather, he treats it as a plausible hypothesis about the nature of body and not as a theory that is outright refutable. (Indeed the interpretive problem motivating this paper is created by the fact that Locke sometimes *seems* to go *further* than this and to actually *endorse* corpuscularianism.) (2) The substance ideas which Locke is concerned with in the adequacy chapter (2.31) are ideas of particular objects or of types of substances more particular than body-in-general—for example, this ring, man, gold. Even if the corpuscularian hypothesis were true, our ideas of these substances would all be inadequate, since we do not know what actual configuration of what sorts of corpuscles serves as

nominal essence of body, like the nominal essence of other, more particular, sorts of substances, must be a complex idea composed of simpler ones. This complex idea is formed when we observe that various bodies—gold, flesh, water, etc.—have something in common and we attempt to generate an idea that will apply to all these items. Any idea to be included in the complex idea that serves as the nominal essence of body will be an idea of some sensible quality which is observed in all these cases. An idea will thus be excluded from the nominal essence of body if the corresponding sensible quality is not found in every member of this group of similar items. This, in effect, is Locke's sensory criterion. A complex idea composed of ideas of sensible qualities could not but be a clear, intelligible one. Since the nominal essence we construct will be a list of those characteristics that something must have in order to qualify as a body, in *refining* this complex idea we should exclude from it any ideas of sensible qualities which we can conceive of something we are inclined to call "body" as lacking. This amounts to Locke's conceptual criterion. What Locke argues in 2.8.9 is that the net result of this procedure, the conception of body that we distill from ordinary sensory experience, is the corpuscularian one.<sup>46</sup> To be a body is, we stipulate, to be something

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the source of the properties of, for example, gold. (3) What Locke is really concerned to argue in the "substance" sections of 2.31 is not so much that none of our ideas of substance perfectly represent their archetypes, but that we have no reason to suppose that they do, and thus we have no reason to suppose that our ideas of substances are adequate. On my interpretation, this *does* apply to our idea of body, as is emphasized below. Although corpuscularianism may be true and so our idea of body could turn out to be adequate, we have no special reason to suppose that this is so. (On Alexander's interpretation, by contrast, Locke must be *assuming* for the purposes of the *Essay* that our idea of body *is in fact* fully adequate.)

<sup>46</sup>See also 3.6.21. There is room, of course, to worry about whether Locke was right about this. In particular, one might consider Berkeley's famed contention that we cannot conceive of shape without color. However, in order to defend his views on the nominal essence of body (as opposed to his views on abstraction), Locke does not have to argue that we can conceive of shape alone, but merely that we can conceive of shape as *solid* but uncolored. (Indeed, Locke argues at length against Descartes that we cannot conceive of *body* as merely extended without including the additional attribute of solidity.) A frustrating fact about 2.8.9 is that Locke never tells us exactly how qualities like color and temperature, which might be supposed to be universally experienced in bodies, get removed from the short list that constitutes the nominal essence of body. (Certainly the grain of wheat example, were it intended to justify the removal of non-corpuscularian qualities, falls short: although the products of division never

possessing size, shape, solidity, motion or rest, and number.<sup>47</sup> This represents a stipulation in that all nominal essences, including the nominal essence of body, are made by us, not nature. They are not, however, made arbitrarily, as Locke repeatedly emphasizes and as his 2.8.9 account attempts to demonstrate for the case of the nominal essence of body.

The special status of corpuscularianism then, for Locke, stems from the following facts: Corpuscularianism is a *uniquely natural* theory for human beings because it postulates that the real essence of body corresponds precisely to the nominal essence of body that we distill from pre-theoretic reflection on ordinary sensory experience.<sup>48</sup> Moreover, corpuscularianism possesses two crucial virtues that any theory purporting to provide genuine scientia must possess: (1) *clarity* of its primitive concepts and (2) the ability to model the flow of qualities from essence, that is, to show how a deductive explanation of the apparent qualities of bodies would go. (In what follows, I will refer to this second desideratum as “*explanatory ca-*

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lose shape, at what point do they lose color?) I suspect that Locke agrees with Descartes that experience presents us with uncolored bodies; see 2.23.11, where he describes how microscopes transform colored bodies into mostly pellucid ones. (They would both therefore reject Berkeley’s claim that “pellucidness is a colour”; see entry 453 of Berkeley’s notebooks, in *The Works of George Berkeley, Bishop of Cloyne*, ed. A. A. Luce and T. E. Jessop (London: Thomas Nelson and Sons, 1948–1957), vol. 1.) Temperature per se is not a concept Locke employs, and, of course, hot bodies are not cold, and cold bodies not hot. Thus, Locke might not have seen either color or temperature as qualities that sense constantly finds in bodies. On the other hand, he might have supposed that they could easily be eliminated by the conceptual criterion; that everyone would agree that something could lack color and temperature and still be a body, while if it lacked solidity, it would be empty space, and if it lacked dimensionality, it could be nothing but spirit. It seems to me difficult to deny that Locke was at least pointing to a psychological truth about the way in which our causal interactions with body lead us to prioritize spatial concepts and concepts of resistance/solidity/hardness in our understanding of what it is to be corporeal.

<sup>47</sup>Michael Ayers has made the related point that for Locke “extended, solid substance” gives the nominal essence of matter—see “Mechanism, Superaddition, and God,” 229.

<sup>48</sup>Thus, while I agree completely with McCann’s insightful claim that Locke is appealing to the commonsense meaning of the term ‘body’, I contend that in doing so he is in effect pointing out an important and, broadly speaking, scientific virtue that corpuscularianism possesses, and that he is thus providing a sort of philosophical foundation for mechanism, albeit one with highly significant limitations.



*capacity*".) Lastly, corpuscularianism is highly reductive, in that the number of primary qualities is minimized by the conceptual criterion, and all other sensory qualities are to be explained in terms of those few primary ones.<sup>49</sup> The resulting *explanatory power* of corpuscularianism counts in its favor, other things being equal.<sup>50</sup> While this does not rule out that some less natural theory might eventually be devised with explanatory capacity and comparable power, Locke clearly held that the best approximation of *scientia* available to his readers was one that started from this nominal essence of body and explained as much as possible in its terms. Moreover, corpuscularianism allowed them to conceive of the relation between primary and secondary qualities as fully as was possible:

After the same manner, that the *Ideas* of these original Qualities are produced in us, we may conceive, that the *Ideas of secondary Qualities* are also *produced*, viz. *by the operation of insensible particles on our Senses*. . . . Let us suppose at present, that the different Motions and Figures, Bulk, and Number of such Particles, affecting the several Organs of our Senses, produce in us those different Sensations, which we have from the Colours and Smells of Bodies, *v.g.* that a Violet, by the impulse of such insensible particles of matter of peculiar figures, and bulks, and in different degrees and modifications of their Motions, causes the *Ideas* of the blue Colour, and sweet Scent of that Flower to be produced in our Minds. (2.8.13)

Likewise, it allowed them to conceive of the relation between real essence and quality as fully as was possible.

In sum, then, the question of what the criteria presented in 2.8.9 are for may be answered as follows: They serve a dual function. At the first level, they illustrate the way in which the nominal essence we assign to body is distilled from our sensory experience of bodies. They thereby exhibit the unique naturalness of mechanism, which takes the primary qualities of bodies to be just those which

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<sup>49</sup>This feature of corpuscularianism was in effect invoked frequently by Boyle and other defenders of mechanism against scholastic natural philosophy, which they accused of positing a real quality to explain every observable characteristic. By contrast, Boyle cites as one of the virtues of mechanism that "there cannot be fewer principles than the two grand ones of mechanical philosophy, matter and motion" ("Excellency of the Mechanical Hypothesis," *Works*, 4:70).

<sup>50</sup>In section 5 below, we will see that these claims about the explanatory capacity and power of corpuscularianism require significant qualification.

form part of our concept of body, as well as suggesting mechanism's clarity, explanatory capacity, and explanatory power. At the second level, they illustrate how reflection on sensory experience allows us to form the very idea of a primary, versus secondary, quality.<sup>51</sup> Ordinary sensory experience and reflection thereon suggest to us the view that some apparent (secondary) qualities may be explained in terms of other, more basic (primary) qualities. The conception of primary quality arrived at in the end, however, is not exhausted by the corpuscularian list; rather, it is the abstract, metaphysical one of an intrinsic and irreducible quality.

#### 4. Mechanism Vindicated?

In stressing the positive side of Locke's treatment of mechanism, it appears that we have seen reason to view Locke as in effect providing an epistemological *foundation* for mechanism. And indeed, if 'foundation' is understood in a weak enough sense, I think that this interpretation is accurate. Reflection on the precise nature of the foundation that Locke has supplied, however, reveals that his defense of mechanism is importantly limited, indeed, that its implications verge on the skeptical. Here we see a crucial point of contrast between Boyle and Locke. Although, as I have argued, Locke provisionally endorses Boyle's claim that "by whatever principles natural things be constituted, it is by the mechanical principles, that their phænomena must be clearly explicated," for Boyle, this remark simply highlights one of the primary advantages of corpuscularianism; for Locke, it also exhibits our conceptual limitations.

As we have seen, Locke argues in 2.8 that mechanism is uniquely natural in that it starts from the nominal essence of bodies and explains as much as possible in its terms. But of course the nominal essence of body need not coincide with the real essence of body. Again, to suppose otherwise would be to suppose that we have a faculty for detecting essences. Thus, Locke's case for the unique naturalness of mechanism gives us no conclusive reason to suppose that the theory is true. The corpuscularian hypothesis represents the real essence of body as agreeing with its nominal essence. Thus,

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<sup>51</sup>I owe this point to Larry Nolan's comments on an earlier version of this paper.

the hypothesis dictates that bodies possess size, shape, motion, and solidity as intrinsic, irreducible, essential qualities, and that all other qualities are derived from the modification of those qualities. But the fact that the corpuscularian hypothesis fits our bodily concepts gives us no special reason to think that it's true; we cannot simply conclude that the real essence of bodies mirrors the nominal essence we attach to the term 'body'. Thus, the implications of this aspect of Locke's limited defense of mechanism are importantly skeptical.

What about Locke's allusions to the clarity, explanatory capacity, and power of mechanism? Might those virtues ground an argument for the truth or probable truth of corpuscularianism? That clarity alone won't do so is readily apparent. It is important to note that the clarity that Locke is pointing to here is, unsurprisingly, of a very empiricist sort: familiarity from sense perception. For us to find a theory intelligible, Locke clearly holds, we need to be able to cash out its basic concepts, ultimately, in terms of simple ideas of sensation. However, corpuscularianism is not unique in possessing this virtue; many different theories could be built out of our basic vocabulary of sensory ideas. Even more significantly, Locke gives us good reason not to assume that our senses are specially attuned to the intrinsic and irreducible qualities of things, reminding us that while we cannot imagine other sensory qualities than those we have met with, this does not show that other sorts of sensory ideas aren't available to creatures with different faculties:

He that will not set himself proudly at the top of all things; but will consider the Immensity of this Fabrick, and the great variety, that is to be found in this little and inconsiderable part of it, which he has to do with, may be apt to think, that in other Mansions of it, there may be other, and different intelligent Beings, of whose Faculties, he has as little Knowledge or Apprehension, as a Worm shut up in one drawer of a Cabinet, hath of the Senses or Understanding of a Man. (2.2.3)

Explanatory capacity and explanatory power, however, may seem to hold more promise as possible grounds for a truth claim for mechanism. In order to settle this question, we will need to consider Locke's treatment of the explanatory *limitations* of mechanism. As recent Locke scholarship has emphasized,<sup>52</sup> certain pas-

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<sup>52</sup>See especially Margaret Wilson's influential paper, "Superadded Properties: The Limits of Mechanism in Locke," *American Philosophical Quarterly* 16 (1979):143–50.

sages of the *Essay* amount of a *critique* of mechanism; we need to consider the implications of that critique.

### 5. Superaddition and the Limits of Our Bodily Concepts

Locke sums up the explanatory limitations of mechanism in 4.3.29:

the coherence and continuity of the parts of Matter; the production of Sensation in us of Colours and Sounds, *etc.* by impulse and motion; nay, the original Rules and Communication of Motion being such, wherein we can discover no natural connexion with any *Ideas* we have, we cannot but ascribe them to the arbitrary Will and good Pleasure of the Wise Architect.

Each of these limitations merits individual attention. The limitation most emphasized by Locke is the inability of mechanism to fully explain sensation, in that it cannot explain the production of an idea in the mind:

Body as far as we can conceive being able only to strike and affect body; and Motion, according to the utmost reach of our *Ideas*, being able to produce nothing but Motion, so that when we allow it to produce pleasure or pain, or the *Idea* of a Colour, or Sound, we are fain to quit our Reason, go beyond our *Ideas*, and attribute it wholly to the good Pleasure of our Maker. (4.3.6)

Locke stresses this point because it is central to his case for the possibility of thinking matter; he argues that it is no less plausible to suppose that God has somehow superadded a faculty of thinking to “some Systems of Matter fitly disposed” (4.3.6) than that he has somehow joined such matter to a thinking immaterial substance; in either case the ‘somehow’ signals a connection inconceivable to us.

One limitation of mechanism, then, is that it cannot fully explain sensation on its own terms, because to do so it must either explain how matter can think or how material motion can affect an immaterial substance. Not only is mechanism unable to explicate a mind-body connection, however; it is also unable to deliver a *full* explanation of the most common properties of bodies themselves. Locke notes in 2.23.23–27 that mechanists have been unable to account for the coherence and continuity of the parts of matter, that is, for the fact that there are stable bodies which do not disintegrate into smaller parts. While macroscopic coherence can be explained in term of microscopic structure—for example, hook-

shaped particles—the problem recurs at the level of the hooks themselves: What prevents the hooks from splitting up and flying asunder? This problem had been the subject of considerable discussion and controversy, and it is not without reason that Locke thinks the theory lacks the resources to solve it.<sup>53</sup> But given the status of mechanism for Locke, to say that mechanism cannot explain cohesion is to say that our concept of body renders cohesion unintelligible to us and leaves us in the position of chalking it up to God if we are to account for it at all.

A still more basic problem suggested by Locke is that impact or the communication of motion, the *how* of all natural change posited by mechanism, is ultimately not fully intelligible:

Another *Idea* we have of Body, is the power of *communication of Motion by impulse*; and of our Souls, the power of *exciting of Motion by Thought*. These *Ideas*, the one of Body, the other of our Minds, every days experience clearly furnishes us with: But if here again we enquire how this is done, we *are equally in the dark*. For in the communication of Motion by impulse, wherein as much Motion is lost to one Body, as is got to the other, which is the ordinarist case, we can have no other conception, but of the passing of Motion out of one Body into another; which, I think, is as obscure and unconceivable, as how our Minds move or stop our Bodies by Thought; which we every moment find they do. (2.23.28)

This is an even more serious charge, for it suggests that the mechanist conception of impulse, put forward as the only intelligible way to account for physical change, is itself fundamentally obscure. Not only, then, does mechanism have limits on what it can explain, it seems that its explanations themselves are limited. Our basic notions of body, it seems, are inadequate.

At this point, we should consider the implications of these problem areas—the connection between motion and idea, cohesion, the communication of motion—for the explanatory capacity and power of corpuscularianism. The explanatory gaps highlighted by Locke show that while corpuscularianism holds the promise of explanatory capacity and power, it cannot actually deliver on that promise. Recall that the explanatory capacity of corpuscularianism,

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<sup>53</sup>For example, Joseph Glanvill had dwelt on the problem of explaining cohesion in *The Vanity of Dogmatizing*. See Glanvill, *The Vanity of Dogmatizing: The Three 'Versions'*, ed. Stephen Medcalf (Hove, Sussex: The Harvester Press, 1970), 48–51.

its ability to model the flow of quality from essence, was cashed out in terms of the lock and key analogy. However, the analogy breaks down once cohesion and impulse are thrown into question. We cannot deduce the key's ability to open the lock from the shape of the key and the shape of the lock if the key might crumble or the pressure from the key might fail to move the lock. Likewise, although corpuscularianism, by positing a very short list of primary qualities, promises a highly reductive theory, it cannot actually carry out the reduction. Since a secondary quality is the power to produce a particular idea, a reductive account of that quality must show us how that particular idea is caused.

Locke holds that when we come to consider these problem areas—the connection between motion and idea, cohesion, the communication of motion—we must appeal to God; we “can reason no otherwise about” these phenomena (4.3.28). Thus, we attribute them to God's action, to his superaddition to bodies of powers not (so far as we can conceive) naturally in them. What superaddition amounts to for Locke and how God is supposed to accomplish it is a perplexing question which we can, fortunately, skirt.<sup>54</sup> The important point for our purposes is that superaddition is an hypothesis to which we are forced by the poverty of our (corpuscularian) concept of body. Indeed, given this, it is not so surprising that Locke has little to say by way of elaborating it—to attribute a quality to God's superaddition is, in these cases, to say that he has bestowed it upon bodies in some way (other than by the bare creation of matter) which surpasses our understanding.

It is clear that Locke considers superaddition to be a plausible hypothesis—that is, it may be the case that the world is as corpus-

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<sup>54</sup>Michael Ayers has argued (“Mechanism, Superaddition, and God”) that Locke's adherence to the geometrical model for the relation between property and essence is unwavering, and that superaddition can amount to nothing more mysterious than setting matter in motion, or arranging it into intricate machines. But there are reasons to resist this interpretation. One textual point is that Locke consistently describes the disposition of the parts of body and the superaddition of the faculty of thinking as separate steps. Furthermore, although it is clear that Locke does not explicitly opt for an occasionalist understanding of superaddition as requiring God's recurring intervention, it is not at all clear how he could rule it out or why he would do so, given his tendency towards agnosticism on such matters. (In 2.21.2, Locke explicitly leaves open the question of whether matter might be wholly destitute of active power.)

cularianism dictates and that God is directly responsible for cohesion, communication of motion, and motion-thought connections. But, it must be emphasized, superaddition is *just* an hypothesis whose salience stems from the fact that we are stuck with it. It is possible that our concept of body is simply inadequate to the real essences of things, that corpuscularianism is a false or incomplete hypothesis, and that, for example, the cohesion of bodies flows directly from the same real essence as shape.<sup>55</sup> Indeed, Locke's continued emphasis in these sections on our conceptual impoverishment emphatically highlights this possibility, since corpuscularianism derives its intelligibility from the very ideas which Locke here describes as limited.<sup>56</sup> Thus, a full explanation of the qualities of things, not relying on an appeal to God (except as creator), might be available to superior beings not subject to our conceptual limitations. That Locke does not rule out such a possibility is testified to by his continued adherence to the geometrical model for the relation of properties to essence, despite the fact that corpuscularianism cannot satisfy the model.

## 6. Corpuscularianism and the Prospects for Scientia

The conclusions of the last three sections may seem to create a puzzle. If corpuscularianism cannot, in Locke's view, in fact deliver on its promise of explanatory capacity and power, leaving us with no special reason to assume that it's true, then why does Locke bother to highlight the apparent advantages of the theory, and why does it retain such a prominent role in the *Essay*? The answer to this question brings us back to my claim that the primary role of mechanism in the *Essay* is as an *illustration*.

Locke holds that corpuscularianism gets us as far as we are likely to get towards understanding *what it would be like* to have scientific knowledge of body. What it would be like is this: We would have a

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<sup>55</sup>Likewise, it is possible that human thought flows from the same real essence as human shape. Locke's argument for the existence of God does not impugn this possibility, since it is premised only on the claim that no substance can transform itself from thoughtless to thoughtful and it concludes merely that some eternal thinking thing must exist.

<sup>56</sup>Matthew Stuart makes the point nicely: "it is rather faint praise of corpuscularianism to say that what prevents it from being supplanted by rival theories is the weakness of our minds" ("Locke on Superaddition and Mechanism," *British Journal for the History of Philosophy*, in press).

clear, fully determinate conception of bodies, of the sort we seem to have when we think of bodies as solid, geometrical objects. We would understand how all of a body's powers followed from its constitution, in the way that (having bracketed philosophical concerns about cohesion and impulse) we understand how a key of a certain shape has the power to open a certain lock. Because corpuscularianism provides this sort of understanding of what a proper *scientia* of body would be like, it provides the best illustration available to us of what real essences might be like, and what the primary qualities of bodies might be. Corpuscularianism cannot, however, get us all the way to *scientia*. It cannot explain cohesion, it cannot explain the production of particular ideas in perceivers, and if impulse itself is made the subject of deeper questioning regarding the communication of motion, it cannot answer those further questions. Because of these "gaps," corpuscularianism cannot provide us with full scientific explanation, the deduction of qualities from essence.<sup>57</sup>

The following question then arises, however: Why can't we revise and improve the nominal essence we assign to body, as we may revise the nominal essence of gold by adding fusibility to it (3.6.31)? Could we devise some different hypothesis about the primary qualities of bodies which might ultimately provide us with Lockean *scientia*? Locke describes his opinion on our prospects in this area quite precisely at 4.3.16:

I have here instanced in the corpuscularian Hypothesis, as that which is thought to go farthest in an intelligible Explication of the Qualities of Bodies; and I fear the Weakness of humane Understanding is scarce able to substitute another, which will afford us a fuller and clearer discovery of the necessary Connexion, and *Co-existence*, of the Powers, which are to be observed united in several sorts of them.<sup>58</sup>

It is clear that Locke does not suppose that the possibility of an improved conception of the nature of body can be ruled out in principle, but, nevertheless, he is deeply pessimistic about it. The grounds for his pessimism, however, are somewhat less clear.

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<sup>57</sup>Indeed, if it could, we would presumably have more reason to suppose that the corpuscularians have correctly characterized the real essence of body.

<sup>58</sup>Note the telling phrase 'instanced in', a locution which confirms the fact that corpuscularianism functions for Locke as an example.



One relevant point, emphasized above in discussing the clarity of mechanism, is that Locke's conception of intelligibility is closely tied to imaginability, and so closely tied to the senses. Thus, any candidate for a primary quality, if it is to play a role in a theory capable of providing us with a satisfactory explanation of the phenomena, must be cashed out in terms of sensory qualities. Perhaps Locke saw little room to maneuver here: Although many theories could be invented which start from sensory qualities, why suppose that any of them could provide a better approximation of scientia than corpuscularianism? Furthermore, the very example of Newtonian gravity might have confirmed him in that pessimism. One way of reading Newton's work, encouraged by Cotes, is as providing an argument that attractive power ought to be added to the corpuscularian list of primary qualities.<sup>59</sup> This move, one might suggest, provides a way of closing two of the explanatory gaps in corpuscularianism, gravity and cohesion. Nevertheless, the result, in Locke's view, does not provide scientia, because just as the corpuscularian conception of impulse leaves us asking about the communication of motion, so the Newtonian conception of attraction leaves us asking about action at a distance.<sup>60</sup> Closing a gap in one place opens up one in another.

One response to this problem might be to abandon the model of scientific understanding that fuels it; this is not Locke's response.<sup>61</sup> Rather, Locke embraces a moderate skepticism: our position as perceivers and conceivers makes corpuscularianism an especially intelligible theory for us, but this position also leaves us unable to ascertain the real essences of things and to reach a fully satisfactory scientific knowledge of them.

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<sup>59</sup>See Cotes's preface to the second edition of the *Principia* (Isaac Newton, *Isaac Newton's Philosophiæ naturalis principia mathematica*, ed. A. Koyré and I. B. Cohen (Cambridge: Cambridge University Press, 1972), 1:26–27).

<sup>60</sup>In the correspondence with Stillingfleet, Locke effectively adds gravity to the list of phenomena that we are unable to explain except by reference to God's activity; see Locke, Works, 4:467–68. I treat Locke's views on gravity and attraction in some detail in Downing, "Locke's Newtonianism and Lockean Newtonianism," *Perspectives on Science* 5 (1997).

<sup>61</sup>He does, however, praise experimental philosophy, but for Locke this represents a sort of consolation prize which provides us with probability, not knowledge. Nevertheless, that the consolation prize is all we can expect to achieve, so we had better pursue it, was an important moral of the *Essay*, both for Locke and for many of his readers.

## 7. The Status of Mechanism and Locke's Project

I have argued that Locke does not assume the truth of corpuscularianism and does not take it as a starting point for philosophizing. This is seen most clearly in passages where he distances himself from the corpuscular "hypothesis," particularly in his treatment of real essences, where corpuscularianism is clearly described as representing *one* view as to what the real essences of bodies *might* consist in, and in his discussion of the explanatory limitations of corpuscularianism. I have developed an interpretation of Locke's discussion of real essences and the primary/secondary quality distinction consistent with this, according to which these are in the first instance metaphysical distinctions, with corpuscularianism serving as an illustration or "instance" of what the primary qualities of bodies might be and what the real essences of bodies might be like.<sup>62</sup>

As it stands, however, this underplays somewhat the extent of Locke's allegiance to mechanism. Corpuscularianism is not, for Locke, a mere illustration—it is not simply one theory among many to which he might have appealed. Corpuscularianism has a special status for Locke in that it is uniquely natural, and it is so because the theoretical account of body it gives is the one that we distill from ordinary sense experience; corpuscularianism posits that the real essence of body corresponds to the nominal essence we assign to 'body'. This naturalness, along with the theory's clarity and explanatory potential, make it uniquely qualified to illustrate, not just these metaphysical notions, but also Locke's conception of *scientia*.

This brings us back to the question of how this understanding of the status of mechanism for Locke should affect our view of the nature of his project in the *Essay*. I have argued that his project was not the fully naturalistic one of starting from our best scientific

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<sup>62</sup>I do not, of course, wish to deny that Locke's primary/secondary quality distinction had its origins in a physical theory. On the contrary, Locke is obviously influenced by Boyle's distinction between the primary affections of matter and sensible qualities. The important difference in my view is that Boyle is committed to a particular account of what the primary qualities of bodies are, and this account and its implications are his primary interest, while Locke was not officially committed to a particular account, and his primary interest, for the purposes of the *Essay*, was in the general distinction.

theory and drawing implications from it. One question provoked by my interpretation is this: In arguing that Locke's notions of real essence and primary quality are abstract, metaphysical notions, am I making the *Essay* out to be a work of metaphysics? The right answer here, I think, is a qualified no; the *Essay* is a work of epistemology, which presupposes and is grounded upon a certain amount of metaphysics. The metaphysics presupposed is for the most part the relatively modest one described in examining Locke's primary/secondary quality distinction: there is a mind-independent world which causally affects us; we can distinguish between the way things appear to us and the way they are. Locke's assumptions were of course widely held, and might fairly be described as the metaphysical backdrop to mechanism;<sup>63</sup> Locke accepts this without officially committing himself to any particular account of the nature of the mind-independent, corporeal world. Locke's interest is not primarily in developing this metaphysics but in examining its consequences for our epistemological position; this is precisely what he is concerned with in making the primary/secondary quality distinction. This is, of course, a fairly traditional understanding of Locke, to which a proper appreciation of the status of mechanism for Locke allows us to return.<sup>64</sup>

*University of Pennsylvania*

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<sup>63</sup>Or, indeed, as part of the metaphysical *component* of mechanism.

<sup>64</sup>This is not, of course, to recommend that commentators go back to ignoring the influence of natural philosophy on Locke's thought.