Walter Charleton, Robert Boyle, and the Acceptance of Epicurean Atomism in England

By Robert Kargon *

WHEN in 1649 Pierre Gassendi published his *Philosophiae Epicuri syntagma,* he epitomized the revival of interest in the Epicurean atomic and moral theories. This work of Gassendi, together with certain earlier essays, became a focus of controversy throughout the remainder of the seventeenth century; in order to become acceptable as a natural philosophy, the atomism of Epicurus and Lucretius first had to be purged of its atheism. Gassendi himself took the first steps in this direction. Whereas the ancient atomic hypothesis posited the inherency of motion in matter, thus removing God as a necessary efficient agent, Gassendi maintained that God was required to impress motion upon the atoms. As the source of motion, God was restored to the atomic philosophy.

Gassendi's atomic philosophy, explaining all physical phenomena as the result of the motion of small atoms in the void, was eagerly received by Englishmen who were similarly attacking the foundations of the Aristotelian world view. As early as 1644 John Pell, the mathematician, Charles Cavendish, and Thomas Hobbes were reading and commending manuscript versions of Gassendi's book.[1] Among the early disciples of Gassendi was the physician Walter Charleton.[2] To Charleton was to go the credit of publishing the first presentation of the revived Epicurean atomism in England.[3]

Thomas Mayo, in his interesting *Epicurus in England,*[4] correctly portrays

* University of Illinois. This work was done with the advice and guidance of Professor Henry Guerlac of Cornell University.

1 Cavendish to Pell, October, 1644, in James Halliwell, *Collection of Letters Illustrative of the Progress of Science in England from the Reign of Queen Elizabeth to that of Charles the Second* (London: printed for the Society, 1841), p. 85.

2 Walter Charleton (1619–1707) was educated at Magdalen Hall (later Hertford College), Oxford, at which he matriculated in 1635. In 1643 he was appointed physician-in-ordinary to Charles I; Charles II appointed him to a similar post in 1653 in exile, although Charleton never left England. He was elected to fellowship in the Royal Society in 1663. The Royal College of Physicians chose him as president, 1689–1691. See Humphrey Rolleston, "Walter Charleton, D. M., F. R. C. P., F. R. S.," *Bulletin of the History of Medicine,* 1940, *8*: 403.

3 Nicholas Hill's *Philosophia Epicurea, Democratica, Theophrastica, proposita simpliciter, non edocta* (Paris, 1601) was not strictly speaking Epicurean. See J. S. Spink, *French Free Thought from Gassendi to Voltaire* (London: Athlone Press, 1960), p. 110. Cf. G. McColley, "Nicholas Hill and the *Philosophia Epicurea,*" *Annals of Science,* 1939, *4*: 380–405.

4 Thomas Mayo, *Epicurus in England, 1650-1725* (Dallas: The Southwest Press, 1934).

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Charleton as the first important Epicurean of the English revival of that philosophy of the latter seventeenth century. In his analysis, however, Mayo overlooks Charleton's major works of 1652 and 1654, beginning with his later, less important *Immortality of the Human Soul Demonstrated by the Light of Nature* of 1657. The circumstances surrounding the publication of Charleton's earlier works are interesting and important. They shed much light upon the difficulties facing the reception of atomism into England as a respectable natural philosophy. It is the purpose of this paper to examine the contributions by Charleton and Robert Boyle to the acceptance of atomism in England.

I

During the 1640's, when Gassendi's position was known primarily through scattered essays and unpublished material, Epicureanism was already a subject of controversy. Among the opponents of the atomic philosophy was the influential Cambridge Platonist John Smith. Smith was sympathetic to the mechanical philosophy of Descartes,[5] but was violently opposed to the atheistic implications of Epicurean atomism. "Epicurism," he maintained, "is but Atheism under a mask." [6] He focused his attack upon three concepts: that motion is inherent in matter,[7] that the soul is material and divisible,[8] and that the world could be formed and could subsist without a divine artificer.[9] In 1649, Gassendi removed the first two objections. He did not follow the ancient atomists in viewing the soul as material and divisible. Moreover, by making the motion of matter a virtue bestowed by God, he removed the taint from it. However, Gassendi's efforts did not go far enough, or were not made emphatic enough, for criticism still was forthcoming. In 1653, Henry More published his *Antidote against Atheism* which criticized certain metaphysical implications of both Cartesianism and Epicureanism. More was at this time an admirer of Descartes but retained certain reservations. He objected specifically to material and mechanical causes for motion,[10] and to the notion that the complex universe could be explained without divine intervention.

It was these objections which Charleton met in his *Physiologia Epicuro-Gassendo-Charltoniana* of 1654.[11] In response to the attacks upon Epicurean atomism, Charleton set about to defend it cleverly and effectively. His approach was threefold. First he tried to demonstrate that modern Epicurean atomism was purged of the heresies which admittedly contaminated the pagan formulations, specifically that the soul is material and mortal, and that motion is inherent in matter. Secondly, he attempted to dissociate the

[5] J. E. Saveson, "Descartes' Influence on John Smith, Cambridge Platonist," *Journal of the History of Ideas*, 1959, *20*: 255–263.

[6] John Smith, *Select Discourses* (London: J. Flesher for W. Morder, 1660), p. 41. These discourses were sermons and lectures presented before 1650.

[7] *Ibid.*, p. 48.

[8] E. Campagnac, *Cambridge Platonists* (Oxford: Clarendon Press, 1901), pp. 106, 111.

[9] Smith, *Select Discourses*, p. 48.

[10] Henry More, *A Collection of Several Philosophical Writings* (London: J. Downing, 1712), p. 38.

[11] Walter Charleton, *Physiologia Epicuro-Gassendo-Charltoniana* (London: Tho. Newcomb, for T. Heath, 1654). Henceforth cited as *Physiologia.*

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atomic doctrine of Gassendi from classical atomism *by joining the assault.* Thirdly, he showed how powerful this doctrine could be in *promoting* piety by demonstrating that it is a very effective proof of God. In this he went far beyond Gassendi. The construction of these defenses was actually begun in his book *The Darknes of Atheism Refuted by the Light of Nature: a Physico-Theologicall Treatise.*[12] As its full title indicates, *Darknes* was primarily a treatise of physical theology. Perhaps prompted by More's tract of 1653, Charleton abandoned the primarily theological approach for a more physical one. As he pointed out, the doctrine of atoms *without God* is highly implausible. That such a complex and interconnected universe which atomism presupposes could evolve through mere chance was beyond Charleton's credibility.[13]

Charleton believed that it would be necessary to point out clearly that the atomic philosophy was capable of explaining the flux of physical reality, remaining not merely harmless to religion but a buttress for it. His full presentation of the atomic philosophy, the *Physiologia* of 1654, was the first systematic presentation of Gassendi's views in the vernacular. The debt to Gassendi is enormous and acknowledged; one can regard the work as a selective translation and expansion of the *Animadversiones.* The purpose of Charleton's " translation " was this: to popularize the doctrine of Epicurean atomism, while demonstrating its theological purity.

In the *Physiologia,* Charleton reconstructs an entire world system based upon hard atoms in motion in the void. Henry More had presented his objections in the form of an *Antidote against Atheism;* Charleton proposes the atomic philosophy as the best " Antidote against our Ignorance." [14] Atomism is advanced as the true explanation of the ancient problem of the origin of physical qualities and their alterations. Applied with ingenuity, this hypothesis offers satisfactory explanations of the secondary qualities: heat, cold, taste, smell, etc. Indeed the hypothesis very impressively solves the problem of the so-called " occult qualities ": electricity, magnetism, gravity, the properties of vacua, etc. These " occult qualities " can be reduced to the action of matter in motion.

All physical phenomena occur within a framework of absolute space and time.[15] Matter is composed of a primal universal substance in the form of impenetrable, invisible atoms; there is no *physical* continuum corresponding to the mental or mathematical continuum. These atoms were created *ex nihilo* by God as the building blocks of the universe. At the creation God infused them with a motive virtue or " Internal Energy " which is the " First Cause of all Natural Actions." [16] The atoms themselves are devoid of the secondary qualities of " colour, sound, odour, sapour, Heat, Cold,

[12] Walter Charleton, *The Darknes of Atheism Dispelled by the Light of Nature: a Physico-Theologicall Treatise* (London, 1652). Henceforth cited as *Darknes.*

[13] *Ibid.*, p. 61.

[14] *Ibid.*, p. 126.

[15] Charleton, *Physiologia,* pp. 68, 76. Compare Newton, *Mathematical Principles of Natural Philosophy and His System of the World,* trans. Andrew Motte, ed. Florian Cajori (Berkeley, Calif.: University of California Press, 1962), p. 6.

[16] Charleton, *Physiologia,* p. 126.

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Humidity, Siccity, Aspersity, Smoothness, Hardness, Softness, etc." [17] All these qualities are but the result of the effect upon the sense of the motion, shape and magnitude of the complex " concretions " formed from the atoms. Alterations in secondary qualities arise from the changed motion of the atoms, resulting in changes in the configuration, size or motion of the concretions. For example, heat and cold are considered exhalations of atoms or concretions. But, " These atoms . . . be not hot essentially." [18] They are " calorifick " atoms only in the sense that they are " Exile in Magnitude, Spherical in Figure, most Swift in Motion," [19] for " Motion is the Mother of Heat." [20] In the atomic philosophy *motion* occupies the central position; this is the mark of the mechanical philosophies.

> If Generation, Corruption, Augmentation, Diminution be only . . . the Effects of Motion, as our immediately praecedent Chapter clearly imports; and that we can have no other cognizance of the conditions or qualities of sensible objects but what results from our perception of the Impulses made upon the organs of our senses by their species thither transmitted; assuredly the Physiologist is highly concerned to make the contemplation of Motion, its Causes, Kinds and Universal Laws the First Link in the Chain of all his Natural Theorems.[21]

Charleton's *Physiologia* is of importance as a pioneer attempt to establish the purified Epicurean atomism of Gassendi in England as a reputable natural philosophy. To Charleton much of the credit must go for removing many theological objections to atomism. Gassendi had made God the cause of motion; Charleton went further and demanded " the Constant Conservation and Moderation [of the World] by His Providence." [22] To Robert Boyle, however, must go a large portion of the credit for the acceptance of atomism in England through his attempts to bring the mechanical hypotheses of both Gassendi and Descartes within the pale of the experimental philosophy.

II

Robert Boyle was among the first scientists in England to utilize " purified " Epicurean atomism. A manuscript published by Richard Westfall demonstrates quite clearly Boyle's early interest in the atomism of Epicurus and Democritus so recently revived.[23] The early work (undated), entitled *Of the Atomicall Philosophy*, reflects Boyle's uneasiness concerning the acceptability of an atomic view. He took great pains to keep his interest concealed; written beneath the title is the admonishment, " These Papers are without fayle to be burnt." [24]

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[17] *Ibid.*, p. 190.
[18] *Ibid.*, p. 294.
[19] *Ibid.*
[20] *Ibid.*, p. 211.
[21] *Ibid.*, p. 435. The role of motion in the work of Gassendi and the Epicurean school has been unfortunately minimized by Marie Boas, " Establishment of the Mechanical Philosophy," *Osiris*, 1952, *10:* 430. Henceforth cited as Boas, " Establishment."
[22] Charleton, *Darknes*, advertisement to the reader.
[23] Richard Westfall, " Unpublished Boyle Papers Relating to Scientific Method," *Annals of Science*, 1956, *12*: 111.
[24] *Ibid.*

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> The Atomicall Philosophy invented . . . by Democritus, Leucippus, Epicurus and their contemporaries . . . reviv'd & so skillfully celebrated in divers parts of Europe by the learned pens of Gassendus, Magnenus, Des Cartes and his disciples . . . Sr Kenelme Digby and many others . . . is now growne too considerable to be any longer laught at and considerable to deserve a serious enquiry . . . [B]y Atoms the assertors of them understand not indivisible or Mathematicall points . . . but minima Naturalia or the smallest particles of bodyes which they call Atomes not because they cannot be suppos'd to be divided by Imagination yet they cannot by nature.[25]

Boyle used the theories of Gassendi and Descartes in his experimental work, but retained a healthy scepticism regarding the certainty of any system. For him, the atomic and Cartesian philosophies were working hypotheses, heuristic instruments in his experimental researches.

> Such writings of very learned men, although they may bear very general titles, yet are not published by their authours as compleat bodies or systems of physiology, but rather as general principles . . . to assist men to explicate the already known phenomena of nature. For of such writings if their authors be (as for the most part they are) subtile and inquisitive men, there may be good use . . . because their writers, to make good their new opinions, must either bring new experiments and observations or else must consider those that are already known after a new manner, and thereby make us take notice of something unheeded before.[26]

Boyle was not, with respect to the corpuscular hypothesis, an original theorist; his dependence upon Gassendi and Descartes was substantial. What Boyle attempted was to bring the mechanical philosophies within the compass of experiment: " I hoped I might at least do no unseasonable piece of service to the corpuscular philosophers by illustrating some of their notions with sensible experiments." [27]

The corpuscular philosophers of whom he writes in the above quotation are both Epicurean and Cartesian. Boyle served both philosophies with his experimental approach. The following paragraphs will concentrate upon the relationship between Boyle's ideas and those of the Epicureans, ignoring for the moment their undeniable Cartesian component.

It has been claimed that Boyle's corpuscular philosophy was " an independent development along lines suggested by Bacon." [28] This claim has not, however, been established. Boyle's corpuscularianism was in its major respects derivative. In her article, " The Establishment of the Mechanical Philosophy," Marie Boas maintains that by the time Boyle wrote his two essays which comprise the *History of Fluidity and Firmness*: " Already he had begun to evolve his own theory, closely related to both Epicureanism and Cartesianism, borrowing from both but distinct from either." [29] A

[25] *Ibid.*, pp. 111–112.

[26] Robert Boyle, *The Works of the Honourable Robert Boyle* . . . , ed. Thomas Birch (6 vols. London: printed for J. & F. Rivington, 1772), Vol. I, pp. 301–302.

[27] Boyle, *Works*, Vol. I, p. 356.

[28] Boas, " Establishment," p. 461.

[29] *Ibid.*, pp. 464–465.

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comparison of Boyle's theory with that of Charleton illuminates the extent of Boyle's " own theory," " distinct " from Epicureanism or Cartesianism:

Charleton (1654) had written:	Boyle (approx. 1659) wrote:
Fluidity we conceive to be a Quality arising meerly from hence;	A body then seems to be fluid, chiefly upon this account,
that the Atoms or insensible particles of which a fluid Concretion doth consist, are smooth in superfice and reciprocally contiguous in some points, though dissociate or incontiguous in others, so that many inane spaces being interspersed among them,	that it consists of corpuscles, that touching one another in some parts only of their surfaces (and so being incontinguous in the rest)
they are upon the motion of the mass or body which they compose, most easily moveable, rowling one upon another, and in a continued fluor or stream diffusing themselves	and separately agitated to and fro, can by reason of the numerous pores or spaces necessarily left betwixt their incontiguous parts, easily glide along each other's superficies and by reason of their motion diffuse themselves,
till they are arrested by some firm body to whose superfice they exactly accommodate themselves.[30]	till they meet with some hard or resisting body; to whose internal surface by virtue of that motion, their smallness, and either their gravity, or something equivalent to it, they exquisitely, as to sense, accommodate themselves.[31]

The theories of both Charleton and Boyle were apparently cast from the same mold. They are both taken from the *Animadversiones in decimum librum Diogenis Laertii* of Pierre Gassendi.[32] It is again instructive to compare Boyle's explanation of firmness with that of Charleton.

Charleton:	Boyle:
And as for the other General Quality, Firmness or Stability, since contraries must have Contrary Causes, and that the solidity of Atoms is the fundament of all solidity and firmness in Concretions: well may we understand it to be radicated in this,	And since fluidness and stability being contrary qualities, are to be apprehended under contrary notions, we may conceive that the firmness or stability of a body consists principally in this,
that the insensible particles, of which a Firme Concretion is composed (whether they be of one or diverse sorts, i. e. similar or dissimilar in magnitude and	that the particles that compose it, besides that they are most commonly somewhat gross, either do so rest, or are so intangled between themselves, that

[30] Charleton, *Physiologia*, p. 318.
[31] Boyle, *Works*, Vol. I, p. 378.
[32] Pierre Gassendi, *Animadversiones in decimum librum Diogenis Laertii* (Lyons, 1649), Vol. I, p. 333.

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figure) do so reciprocally compress and adhaere unto each other, as that being uncapable of rowling upon each others superfice, both in respect of the ineptitude of their figures thereunto, and the want of competent inane spaces among them,

there is among them a mutual cohesion, whereby

they generally become incapable (without extream violence) of Emotion, Dissociation, Diffusion, and so of termination by any other superfice but what they themselves constitute.[33]

they are rendered unapt to flow or diffuse themselves every way and consequently to be, without violence, bounded and figured by other surfaces than those which their connection makes themselves constitute.[34]

Boyle's supposedly " distinct " theory, like that of Charleton, is strikingly close to that of Gassendi.[35] Boyle has, however, adjusted the Epicurean theory in order not to conflict with that of Descartes. Instead of presenting an original theory, Boyle juxtaposed Epicurean (" are intangled between themselves ") and Cartesian (" either do so rest ") explanations, and omitted references to inane spaces. The basic approach, both in content and style, is that of the Epicureans.

Boyle himself maintained:

> . . . I shall name to you the learned Gassendus his little *Syntagma of Epicurus*'s philosophy and that most ingenious gentleman Monsieur Descartes his principles of philosophy. For though I purposely refrained, though not altogether from transiently consulting, about a few particulars, yet from seriously and orderly reading those excellent (though disagreeing) books, or so much as Sir Francis Bacon's *Novum Organum*, that I might be not prepossessed with any theory or principles, till I had spent some time in trying what things themselves would incline me to think; yet beginning now [published 1661] to allow myself to read those excellent books, I find by the little I have read in them already that if I had read them before I began to write, I might have enriched the ensuing essays with divers truths, which they now want. . . .[36]

According to Boas, the theories of fluidity and firmness belong to an earlier stage of Boyle's theoretical development. His *Origin of Forms and Qualities* of 1666, however, " contains a really complete exposition of Boyle's own views on the underlying structure of matter, and also an enunciation of the ' corpuscular philosophy,' Boyle's own version of the mechanical philosophy." [37] Was this corpuscular philosophy " indeed a new hypothesis " ? [38] Boyle's own position can be summarized as follows.

There exists a universal matter in the form of particles which possess *size*, *shape*, and *motion*. These particles or corpuscles are mentally and

[33] Charleton, *Physiologia*, p. 320.
[34] Boyle, *Works*, Vol. I, p. 401.
[35] Gassendi, *Animadversiones*, Vol. I, pp. 338–342.
[36] Boyle, *Works*, Vol. I, p. 302.
[37] Boas, " Establishment," p. 467.
[38] *Ibid.*

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divinely divisible, but nature rarely divides them. These "physically indivisible" corpuscles [39] form clusters or concretions which affect the senses. The motion of matter was endowed by God.[40] The size, shape, and motion of the concretions determine the physical properties of the body which they compose. Motion is of particular importance, because motion could alter the size and shape of the concretions. "The *Origin of Forms and Qualities* was frankly designed to settle once and for all the basic principles of the underlying structure of matter. Never again did Boyle discuss his theory of matter in such detail." [41]

This theory of matter then must be Boyle's position. But compare it with that of Gassendi and Charleton as outlined above, or with that of Descartes. If Boyle's theory of the structure of matter was *essentially* different from the existing mechanical philosophies, it still remains to be shown. The evidence cited seems to indicate that Boyle's "theory" was at best a juxtaposition of Epicurean and Cartesian views.

Boyle himself admitted a close affinity for the doctrines of the classical Epicureans, but in his religious fastidiousness could not accept several points: "The antient Corpuscularian philosophers (whose doctrine in most other points but not in all we are most inclinable to) not acknowledging an Author of the universe were thereby reduced to making motion congenit with matter." [42] This atheism, of course, was repugnant to Boyle. Even Gassendi's version which made motion "an looseable property congenit to matter," although created by God was suspect. Gassendi's God, after impressing the motive force upon matter, may quietly retire from the scene. Boyle's God is a God of Providence. His philosophy teaches: "Not only that God gave motion to matter but that in the beginning He so guided the various motions of the parts of it as to contrive them into the world he designed that they should compose . . . and established those rules of motion which we are wont to call the laws of motion." [43] This position is, of course, not far removed from Charleton's belief in "the Creation of the Universe, and the constant Conservation and Moderation of the same by His Providence." [44]

Boyle also cannot accept the Epicurean view of absolute space and time. As Gassendi and Charleton presented them, time and space differ from the rest of nature. They are uncreated, antecedent to creation, and would survive the universe should God choose to annihilate it. Such limitation upon divine power is unacceptable to Boyle.[45]

There are two reasons why Boyle's influence was important to the acceptance of Epicurean atomism in England, over and above any theological considerations. His experimental approach to the atomic philosophy went beyond any similar attempts in both quantity and quality. Secondly, Boyle

[39] *Ibid.*, p. 468.

[40] *Ibid.* This is not a repudiation of the Epicurean position as Boas claims, at least not of the contemporary Epicurean position of Gassendi and Charleton.

[41] *Ibid.*, p. 469.

[42] Boyle, *Works*, Vol. III, p. 15.

[43] *Ibid.*, Vol. IV, p. 68.

[44] Charleton, *Darknes*, advertisement to the reader.

[45] Boyle, *Works*, Vol. VI, p. 684.

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published his works during a period in which there was a fertile field for the reception of such an anti-Aristotelian mechanical philosophy, (hopefully) grounded in experiment. The Royal Society, which Boyle participated in founding, provided a willing and interested public for the essays which he published concerning the mechanical philosophy. Through the combination of appropriate method and content, and excellent timing, Boyle played an unquestionably important role in the acceptance of Epicurean atomism as a respectable natural philosophy. Owing in part to Boyle's work, the *Ballad of Gresham Colledge* could reflect current opinion:

> Thy Colledg, Gresham, shall hereafter
> Be the whole world's Universitie,
> Oxford and Cambridge are our laughter;
> Their learning is but Pedantry.
> These new Collegiates doe assure us
> Aristotle's an Asse to Epicurus.[46]

[46] Dorothy Stimson, "Ballad of Gresham Colledge," *Isis*, 1932, *18*s 109.

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