

The Problem of
Animal Generation in
Early Modern Philosophy

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Atoms and Minds in Walter Charleton's Theory of Animal Generation

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1. INTRODUCTION

The generation of animals, and especially the generation of human beings, is a recurrent theme in the work of the British physician and philosopher Walter Charleton (1619–1707). Based on an atomistic analysis of generation and corruption in his *Physiologia Epicuro-Gassendo-Charletoniana* (1654), he develops a purely mechanistic theory of animal generation in the *Natural History of Nutrition, Life, and Voluntary Motion* (1659). In later writings such as the *Natural History of the Passions* (1674), he expands the basic outlines of his views on animal generation into an atomistic account of emergent properties of higher animals. In addition, in works such as the *Dissertatio Epistolica de ortu animae humanae* (1659) and *The Immortality of the Human Soul, Demonstrated by the Light of Nature* (1659), he attempts to reconcile an atomistic view of the generation of the human organism with the Christian doctrine of an immortal human soul.

In recent years, two interpretations of the methodology behind Charleton's theory of animal generation have been influential. The first interpretation, put forth by Margaret Osler, ascribes to Charleton an empiricist methodology that, according to her view, is due to theological views that emphasize the role of God's will rather than the role of God's intellect.¹ According to Osler, Charleton's voluntarist theology leads to an empiricist theory of knowledge. For example, she ascribes to him the view that some of the primary qualities

¹ Margaret Osler, "Descartes and Charleton on Nature and God," *Journal of the History of Ideas* 40 (1979): 445–56, esp. 453–6. For an analogous interpretation of the theological background of Gassendi's philosophy of nature, see Margaret Osler, *Divine Will and the Mechanical Philosophy: Gassendi and Descartes on Contingency and Necessity in the Created World* (Cambridge and New York: Cambridge University Press, 1994). Charleton developed his theological views in *The Darknes of Atheism Expelled by the Light of Reason* (London: William Lee, 1652).

of atoms can be known only by empirical methods. Therefore, she thinks that according to Charleton primary qualities of atoms can be known at best with a good degree of probability. In fact, such an interpretation seems to be supported by the following passage from the *Physiologia*:

Of the existence of *Bodies* in the World, no man can doubt, but He who dares indubitate the testimony of that first and grand Criterion, SENSE, in regard that all *Natural Concretions* fall under the perception of some of the Senses: and to stagger the Certitude of Sense, is to cause an Earthquake of the Mind, and upon consequences to subvert the Fundamentals of all Physical Science. Nor is Physiology, indeed, more then the larger Descant of Reason upon the short Text of Sense: or all our *Metaphysical* speculation (those only excluded, which concern the Existence and Attributes of the Supreme Being, the *Rational Soul* of man, and *Spirits*: the Cognition of the two former being desumed impressions implantate, or coessential to our mind; and the beliefs of the last being founded upon Revelation supernatural) other then Commentaries upon the Hints given by some one of our External senses.²

By contrast, the second interpretation reads Charleton's philosophy of nature as an example of early modern eclecticism. Michael Albrecht and Eric Lewis characterize this form of eclecticism as the attempt to select what is true in the work of ancient philosophers such as Empedocles, Plato, Aristotle, Anaxagoras, and Democritus and to combine this with what is true in modern mechanical philosophy.³ In fact, talking about philosophers he labels "Electors," Charleton in the *Physiologia* confesses "[h]ere to declare ourselves of this Order."⁴ As Albrecht points out, applying the notion of eclecticism to the *Physiologia* is problematic because this work is an expanded and reworked translation of passages from Pierre Gassendi's *Animadversiones in decimum librum diogenes Laertii*. As Albrecht argues, Charleton in the *Physiologia* does not select elements from various sources but rather adopts Gassendi's atomism as a whole.⁵

Although these interpretations shed light on interesting features of Charleton's thought, they do not adequately represent the extent to which

² Walter Charleton, *Physiologia Epicuro-Gassendo-Charletoniana: A Fabrick of Science natural Upon the Hypothesis of Atoms* (London: Thomas Heath, 1654), 18–19. Citations of passages from English works follow the original orthography; translations of passages from Latin works are my own; all italics are those of the original texts.

³ Michael Albrecht, *Eklektik: Eine Begriffsgeschichte mit Hinweisen auf die Philosophie- und Wissenschaftsgeschichte* (Stuttgart: Frommann-Holzboog, 1994), 276–8; Eric Lewis, "Walter Charleton and Early Modern Eclecticism," *Journal of the History of Ideas* 62 (2001): 651–64.

⁴ Charleton, *Physiologia*, 5.

⁵ Albrecht, *Eklektik*, 276. For a full exposition of Gassendi's theory of animal generation, see François Duchesneau, *Les modèles du vivant de Descartes à Leibniz* (Paris: Vrin, 1998), chap. 3.

Charleton's views on animal generation are rooted in a kind of methodological pluralism which goes beyond empiricism and eclecticism. Already the *Physiologia* applies a range of argumentative strategies that, in Charleton's own view, do not have the status of proofs but rather are designed to show the "verisimilitude"⁶ of the doctrines he defends. Thus, it is important to emphasize that these argumentative strategies do not amount to an aprioristic, axiomatic-deductive methodology. Nevertheless, he applies a variety of argumentative techniques that purport to provide rational grounds for preferring a version of an atomistic doctrine of animal generation to various alternative accounts. At various places, Charleton uses the Epicurean-Stoic theory of "common notions" for this purpose. In the *Physiologia*, he modifies Gassendi's views on the nature of common notions by interpreting these notions as something expressed in our everyday language. In Charleton's later writings, analogical arguments play a role in the explication of animal generation by means of its analogy with nutrition, thus filling in the conceptual framework provided by common notions. In particular, he uses this analogy to capture the role of vital heat and "vital spirits" – subtle parts of matter – in the process of embryo formation.

Moreover, as the passage from the *Physiologia* just cited indicates, Charleton already at this early stage makes two important restrictions to an empiricist program: according to his view, there are cognitive contents that can be known only by revelation, and, more significantly for the present context, there are cognitive contents that are in some sense innate. One of the aims of this essay is to spell out in what sense, according to Charleton, there is a realm of innate ideas and how this bears on his views on the origin of minds. In the *Immortality of the Human Soul*, he denies that common notions are all caused by sense perception and claims that some of them are known by means of reflection of the mind on its own operations. Contrary to Gassendi, he holds the view that through reflection these notions are not formed but rather made explicit. In this sense, he regards innate common notions as implicit knowledge always structuring our thought about the mind. Interestingly, throughout his work Charleton does not regard common notions as something that could be justified. Rather, like Gassendi he interprets them as criteria for judging the truth of given propositions. Whereas in the *Physiologia* common notions still are seen as something caused by sense perception and therefore as something revisable, in later writings common notions based on reflective knowledge are seen as something having certainty. Nevertheless, they are not introduced as an aprioristic starting point of deductive arguments; rather the process

⁶ See Charleton, *Physiologia*, 419.

of transforming implicit knowledge of innate common notions into explicit knowledge is characterized as a process of analysis starting with a description of aspects of mental activity.

2. THE METAPHYSICS OF GENERATION AND CORRUPTION

Not only Charleton's version of atomism but also some of his most interesting methodological ideas are rooted in the philosophy of Gassendi. Thus, describing in what sense Charleton's methodology involves more than an early version of empiricism cannot be separated from the question in what sense Gassendi's methodology goes beyond empiricism. Let us begin with what Gassendi in the *Animadversiones* says about the nature of common notions or "anticipations":

[A]n anticipation is at first some singular thing, or so to speak the idea of a singular thing, in so far as it is impressed by a singular thing and represents the singular thing by which it is created; but subsequently it is a universal, insofar as not only the thing by which it is created but also by means of its imitation several similar ones are imagined by the mind.⁷

Moreover, he gives to his view of the nature of anticipations the following canonical formulation: "All anticipation or precognition, which is in the mind, depends on the senses, and this either by means of incursion, or proportion, or similitude, or composition."⁸ Interestingly, he deals with the issue of anticipations under the general heading of criteria of truth, and he explains that a criterion is "an organon or an instrument of judging."⁹ Moreover, he explicitly identifies the Epicurean *prolepsis* with the Stoic "common notions," with Aristotle's "pre-existent cognition," and with Cicero's "presumption" and "information anticipated in the mind."¹⁰ Especially using the juridical term "presumption" to characterize the nature of anticipations makes it clear that what Gassendi has in mind is not something like an empirical *justification* of common notions. If empiricism, in overly general terms, is characterized as the view that all cognitive contents can be justified in an inductive way, Gassendi's theory of common notions is not a form of empiricism. Rather, he

⁷ Pierre Gassendi, *Animadversiones in Decimum Librum Diogenis Laertii, qui est de vita, moribus, placitisque Epicuri*, 3rd ed. (Lyon: Barbier, 1675), 1: 80. For an exposition of Epicurus's theory of "proleptical" notions and Gassendi's adaptation of this theory, see Wolfgang Detel, *Scientia rerum natura occultarum: Methodologische Studien zur Physik Pierre Gassendis* (Berlin and New York: De Gruyter, 1978), esp. 33–8, 52–5.

⁸ Gassendi, *Animadversiones*, 1:90.

⁹ *Ibid.*, 71.

¹⁰ *Ibid.*, 79. Gassendi refers the reader to Aristotle *An. post.* 1, 1, and to Cicero *De divin.* 2.

sees the relation of sense perception to common notions as initially a purely causal one. Nevertheless, these concepts subsequently acquire a new function as criteria for judgments about the truth of propositions. In particular, they acquire this function because they lay down standards of similarity. In the sense that particular things play a role in forming standards of similarity, Gassendi regards not only ideas representing particular things but also particular things themselves as something conceptual.

Much of what Charleton says in the *Physiologia* about the role of common notions in assessing the rational acceptability of various theories of animal generation can be seen as a modification of Gassendi's view of the nature of common notions. As in Gassendi, the connection between experience and common notions is not one of justification, and as in Gassendi, common notions are used as instruments of judgment. The modification Charleton introduces is twofold: First, he shifts the emphasis from the role of common notions as criteria of truth to their role as criteria of what he calls "verisimilarity." This concept clearly differs from an empiricist conception of inductive support and rather has to do with assessing the degree of rational acceptability as an indicator of closeness to truth. Second, he interprets common notions as something expressed in and therefore accessible through the analysis of everyday language. Thus, the conception of, for example, generation and corruption implicitly contained in our everyday language is seen as a criterion for judging the closeness to the truth of different metaphysical accounts of generation and corruption.

One of the applications of common notions can be found in Charleton's discussion of the question in the framework of which metaphysical theory of mixing parts the generation of complex objects (including animals) can be best understood. He formulates the following alternatives:

[T]here are Two different kinds of *Commistion*, whereof the one is, by Aristotle (*de Generat. 1 cap. 10*) termed $\Sigma\upsilon\theta\epsilon\sigma\iota\varsigma$, *Composition*, and by others, $\pi\alpha\rho\alpha\theta\epsilon\sigma\iota\varsigma$, *Apposition*: the *other* is called, in the Dialect of the Stoicks, $\Sigma\upsilon\gamma\chi\upsilon\sigma\iota\varsigma$ *Confusion*, and in that of Galen, $\pi\rho\alpha\sigma\iota\varsigma$, *Coalition*, or *Temperation*. The *Former* is when those things, whether Elements, or others, that are mixed together, do not interchangeably penetrate each others parts, so as to be conjoined *by means of minima*; but either themselves in the whole, or their parts, onely touch each other superficially. . . . The *Latter*, when the things commixed, are so seemingly united, and concorporated, as that they may be conceived mutually and totally to pervade and penetrate each other, *by means of minimal parts*, so as that there is no one insensible particle of the whole mixture, which hath not a share of every ingredient.¹¹

¹¹ Charleton, *Physiologia*, 418; see Gassendi, *Animadversiones*, 1:207.

Subsequently, he begins arguing for the adequacy of the first view of the nature of mixing parts and against the adequacy of the second view by using an ordinary language argument:

If we look no further than the *Common Notion*, or what every man understand by the Terme, *Mistion*; it is most evident, that the things commixed ought to *Remain* in the *Mistum*; for if they do not remain, but Perish, both according to substance and Qualities, as Aristotle and the Stoicks hold, then is it no *Mistion* but a *Destruction*: and since the propriety of this Notion cannot be solved by any other reason, but that of the *Atomists*, that the particles of things are in commistion onely apposed each to other, without amission of their proper natures; what Consequence can be more naturall and clear than this, than that their opinion is most worthy our Assent and Assertion?¹²

This line of argument is developed further in the direction that not only a single common notion should be used as a criterion of judging the adequacy of a theory of mixing but a whole net of common notions involving not only the relation between the parts and a composite entity but also the structure of space and extension. This becomes clear in his discussion of an attempt he ascribes to Chrysippus to save the common notion by claiming that the particles of things mixed keep their substance and qualities but penetrate each other. Charleton objects that "from that his Position it necessary follows. (1) That two Bodies are at once in one and the same place, both mutually penetrating each others dimensions, or without recipocall expulsion (2) That a pint of Water, and a pint of Wine commixed, must not fill a quart. . . (3) That a very small Body may be Coextensive, or Coequate to a very great one."¹³ Thus, in Charleton's view Chrysippus's attempt to save the common notion of mixture violates other common notions concerning the location and extension of bodies. A similar strategy that uses a sorites argument to bring out everyday intuitions as a rational criterion for the adequacy of theoretical claims is expressed in a passage directly derived from Gassendi's *Animadversiones*:

Nor, indeed, hath Aristotle Himself been more happy than Chrysippus, in his invention of a way, to remove or palliate the gross repugnancy of his opinion, to the proper importance of the term, *Commistion*, as may easily be evinced by a short adduction of it to the test of reason. . . . [W]e should only demand of him, if after the instillation of one single drop of Wine into 10000 Gallons of Water, a second drop should be superinfused, and after that a third, a fourth, and so more and more successively, till the mass of Water were augmented to

¹² Charleton, *Physiologia*, 419.

¹³ *Ibid.*

ten, a hundred, thousandfold: *of what Nature would the whole mixture of Wine and Water be?*¹⁴

Charleton goes on again to invoke common notions. He argues that if Aristotle had in mind that the resulting middle thing arises from the destruction of both ingredients, the original parts would not remain, which, in Charleton's view, contradicts both Aristotle's own assumptions and our common notion. Alternatively, if Aristotle had in mind that the resulting middle thing participates in the properties of the ingredients, then the question Charleton (using the unusual term "mistile" for an ingredient of a mixture) poses is, "How, and in what respect, that Middle and Common thing comes to be participant of the Extremes of each Mistile?"¹⁵ Following Gassendi, he claims that all answers that are possible from an Aristotelian viewpoint are contrary to common notions. In case the middle thing participates in the matter of the ingredients, Aristotle must admit that the whole matter of the parts is contained in the composite entity; and if, as the common notion demands, these portions of matter occupy different places in space, the parts can touch each other only at their surfaces. In case the middle thing participates in the forms of the ingredients, as Charleton believes, Aristotle would have to admit that the forms of the parts survive in the composite entities, because otherwise, contrary to the common notion, it would be a case of corruption of the ingredients. Finally, in Charleton's view something similar holds for the qualities of the ingredients: "neither ought Aristotle to deny the *permanence* of them: for, since in them consisteth the chief Capacity or Power of recovering the last Forms: if they perish, how can they be inservient to the recovery of the Forms?"¹⁶

Thus, a theory of the generation of composite entities in terms of composition of minimal parts that touch each other superficially but do not change their intrinsic qualities is seen as rationally preferable to the view Charleton ascribes to Aristotle and Galen. That the ingredients of composite entities have these structural properties and not those associated with the theory of the confusion of minimal parts is not presented as something capable of inductive support. At the same time, these concepts and intuitions also are not characterized as something providing support for logically conclusive arguments. Rather, thinking of composite entities in terms of a composition of unchangeable natural *minima* is described as something implied in our everyday concepts and intuitions used as rational criteria of judging the "verisimilitude" of theories. Charleton does not claim that an atomistic theory of the composition

¹⁴ Ibid., 420; see Gassendi, *Animadversiones*, 1: 208.

¹⁵ Charleton, *Physiologia*, 420–1; see Gassendi, *Animadversiones*, 1:208.

¹⁶ Charleton, *Physiologia*, 421–2; see Gassendi, *Animadversiones*, 1:209–10.

of minimal parts is the only possible account of generation and corruption that is able to meet these criteria. Nevertheless, his use of common notions shows that an atomistic metaphysics of generation and corruption is compatible with the demands of reason, whereas existing alternative accounts are not.

3. VITAL HEAT, VITAL SPIRITS, AND ANIMAL GENERATION

To fill out the framework of generation as combination of minimal parts, Charleton in the *Natural History of Nutrition, Life, and Voluntary Motion* makes use of an analysis of the process of nutrition in order to arrive at a description of some more specific aspects of the process of animal generation by means of analogical reasoning. That an informative analogy between animal generation and nutrition holds is made plausible by the following argument:

To forme, and nourish, are not only acts of one and the same soul; but so alike, that it is no easie matter to distinguish betwixt them. For, *Generation* and *Accretion* are not performed without *Nutrition*; nor *Nutrition*, or *Augmentation*, without *Generation*. To nourish, is to substitute such and so much of matter, as was decay'd in the parts. . . . In like manner, *Accretion* is not effected without *Generation*; for all natural bodies, upon the accession of new parts are augmented, and those new parts are such of which these bodies were first composed: and this is done, according to all the dimensions; so that, to speak properly, the parts of an Animal are encreased, distinguished, and organized all at once.¹⁷

In particular, the analogy between generation and nutrition adds to the general metaphysical theory of generation two features characteristic of animal generation. The first one concerns the idea of the homogeneity of parts entering into an organic body during the process of generation with those already components of the organism:

Nature doth nourish and amplify all parts of an Animal with the same matter, or humour (not with a diverse) out of which she constituted or framed them at the first. Because, whatsoever is superadded to the parts, during their growth, ought to be of the same substance, with what was praexistent, and so must consist of matter of the same genus: their Renovation as well as first Corporation

¹⁷ Walter Charleton, *Natural History of Nutrition, Life, and Voluntary Motion* (London: Henry Herringman, 1659), 2. A Latin version was published under the title *Oeconomia animalis, novis in medicina hypothesibus superstructa & mechanicè explicata* (London: Daniel & Redmann, 1659).

being effected by épigénèsis, Aggeneration, or superstruction. So that we may well conclude, that Nutrition is nothing else but continual Generation: and as necessary to the Conservation of every individual nature, as Generation itself is to the conservation of the Universe.¹⁸

The second feature of animal generation illuminated by means of the analogy with nutrition is the role and nature of vital heat. In Charleton's view, the vital heat at work both in nutrition and animal generation can be compared to a flame constantly requiring fuel:

That since the chief principle of life in every Animal, is a certain indigenary Heat (analogous to pure flame, such as the most rectified Spirit of Wine yields, upon accension) which by continuall motion and activity agitates the minute and exsoluble particles of the body, doth dissolve, and consume, or disperse them; of necessity, the whole Fabrick would soon be destroy'd, unlesse there were a continuall renovation or reparation of those decayes, by a substitution and assimilation of equivalent particles, in the room of those dispersed and absumed.¹⁹

This naturalistic conception of vital heat explicitly is seen as alternative to Aristotelian accounts of vital heat involving a kind of celestial influence on the sublunary world:

[A]ll Fire whatever (that Elementary Fire, which the *Aristotelians* conceive to be so pure, as to need no *pabulum* or aliment, being a meer Chimera) doth conserve it selfe onely by the destruction of the matter, in which it is generated, So that, indeed, we have one and the same Cause both of our Life, and of our Death; or (to speak more properly) our Life is nothing but a continuall Death, and we live because we dye.²⁰

In fact, an Aristotelian such as William Harvey holds the view that the conception of innate heat cannot be explicated without interpreting innate heat as a "celestial substance." In this sense, Harvey characterizes innate heat as the "instrument of God."²¹ By contrast, Charleton uses the framework of an atomistic ontology to formulate a thoroughly naturalistic theory of innate heat. Nevertheless, this naturalistic conception is not the outcome of an inductive

¹⁸ Charleton, *Natural History of Nutrition*, 2–3.

¹⁹ *Ibid.*, 3–4.

²⁰ *Ibid.*, 4–5.

²¹ William Harvey, *Exercitationes de generatione animalium: Quibus accedunt quaedam de partu: de membranis ac humoribus uteri: & de conceptione* (London: Octavianus Pulleyn, 1651), exercitatio 70.

methodology. Rather, the mode of operation of innate heat is characterized by means of an analysis of the concept of fire:

Flame (as reason defineth it) is a substance luminous and heating, consisting in a perpetuall *Fieri*, i.e., an indesinent accension of the particles of its pabulum, or combustible matter, and perishing as fast as it is generated: so that fire is made fire, and again ceaseth to be fire, in every, the shortest moment of time. . . . Continuall *Dispersion*, therefore, being the proper effect of Fire; the matter or fewell, whereon it subsisteth, cannot but be in perpetuall flux or decay. In like manner . . . the *Lamp of life* consisting in a continuall accension of vital spirits in the blood, as that passeth through the heart; those vital spirits, transmitted by the arteries to the habit of the body, no sooner arrive there, but as they warme and vivifie the parts, so do they immediately fly away, and are dispersed into the air.²²

The Stoic theory of common notions again comes into play, this time in the form of invoking a "common axiom," when Charleton writes about the causes of the renovation of parts in nutrition:

The *Material*, or Constitutive principle, we take to be a certain sweet, mild and balsamical Liquor, analogous to the white of an egge, out of which the chicken is formed. For since all Animals are nourished with the same, out of which they were at first fabricated, according to that common Axiom, *we nourish ourselves of the same stuff we consist of*, . . . and since they have their origine out of the *Colliquamentum*: we may well conclude, that the *Nutritive Juice* is in all qualities correspondent to the *Colliquamentum* of the white of an Egge.²³

He distinguishes three stages in the process of nutrition.²⁴ In the first stage, which he calls "apposition," parts of the nourishment are brought into contiguity with parts of the body. In the second stage, "agglutination," parts of the nourishment enter into a continuum with parts of the body. Given his general views about the nature of generation as the combination of minimal parts touching each other on their surfaces without internal change, such a process can take place only on the level of complex constituents of food and the organism. In the third stage, "assimilation" or "transmutation," parts of the nourishment are "made of the same substance with" parts of the body. Again, given the general account of generation and corruption, as well as the more specific view that food and the organism are built of parts of the same kind, the process Charleton may have had in mind here seems not to have

²² Charleton, *Natural History of Nutrition*, 6–7.

²³ *Ibid.*, 9.

²⁴ *Ibid.*, 10.

been so much a change in the internal nature of the constituents of food but rather their acquiring a causal role within the organism.

In subsequent chapters of the *Natural History of Nutrition, Life, and Voluntary Motion*, he uses the analogy between animal generation and nutrition as the general framework of a physiological account of embryo formation. To develop this account, Charleton discusses whether there are "milky veins" (*venae lacteae*) connecting the stomach, the uterus, and the breasts, transporting nutritive juice or a substance analogous to it. As he points out, no anatomist ever has been able to discover these passages. Nevertheless, he thinks that the view that they exist is "highly probable."²⁵ In a first step, he argues for the claim that milk and the nutritive juice are "one and the same thing." In his view, this is apparent from the fact that milk and nutritive juice agree in "all their qualities" and, moreover, that they are convertible into each other. Among the qualitative resemblances, he lists the following:

- (1) They both have a fatty substance: otherwise neither could be fit either to sustain the Lamp of life, or to instaurate the parts; nor can the blood contain any such fatty substance in it, but what is derived from the Chyle. (2) As Milk doth consist of two parts, the *serum* and *crassamentum*; so likewise doth Chyle. . . . (3) As Milk, if kept over-long, especially in a warm place, or corrupted by any Acid juice, doth turn sour; so also doth the Chyle.²⁶

Moreover, he thinks that nursing a child proves that, in the woman, the nutritive juice is converted into milk and that, in the stomach of the infant, the milk is reconverted into nutritive juice. As he claims, considering these resemblances we can conclude that "they have much more of reason on their side, who conceive Milke to be nothing but meer Chyle brought from the stomach to the Paps, by peculiar passages; and therein promoted to somewhat more of perfection: than they, who think it to be made of blood whitened in the glandules of the paps."²⁷

In a second step, he argues for the "verisimilitude" of the claim that the nutritive juice plays a role in the formation of the embryo. To substantiate this claim, he invokes the authority of Hippocrates as well as the observations of Harvey. As he points out, according to Hippocrates, "*The foetus attracts what is most sweet in the blood, and at the same time benefits from a small portion of milk.* Where He hinteth the true cause, why it is unwholesome and dangerous for Infants to suck women with child, *viz.* because the best of the

²⁵ Ibid., 19–20.

²⁶ Ibid., 24.

²⁷ Ibid., 25.

milk is attracted by the Foetus, in the womb, and the worst is carried to the paps."²⁸ Moreover, he quotes Harvey's description of cavities (*cotyledones* or *acetabula*) found in the bellies of pregnant animals:

[I]nto each of them penetrate deeply the most fine branches of the vessels of the umbilical cord: for in them the aliment of the foetus is contained, viz. not a bloody but a mucous one, of a very similar texture as the white substance in fat people. From which it is also manifest that the foetus of split-footed animals (as also all others) is not nourished by the mother's blood.²⁹

To this, Charleton suggests to add "the consideration of that great *Sympathy* or consent betwixt the womb and paps, so frequently observed in women":

Which Consent cannot be caused by nerves, nor by veins, nor by arteries, nor by similitude of substance . . . and therefore most probably, by mediation of these presupposed Chyliferous vessels tending from the paps to the womb. (1) Not by *Nerves*; because the paps derive their nerves from the fourth intercostal pair, or the fifth pair of the thorax: and the womb is supplied with sense from the nerves of the *os sacrum*, and also from the sixth conjugation of the brain. (2) Not by *veins or arteries*; because they are, both, destitute of sense. . . . (3) Not by *Similitude of Substance*; because the paps consist mostly of Glandules, and the body of the womb is membranous.³⁰

Thus, in the two argumentative steps just considered, empirical observations are not used for giving a certain physiological claim inductive support. In this sense, the "verisimilitude" Charleton has in mind here is not one of a degree of inductive justification. Rather, observations are used to exclude alternative physiological views according to which both the production of milk and the formation of an embryo are due to the causal role of blood.

The view that animal generation can be understood through its analogy with nutrition also stands behind Charleton's account of the formation of blood. As in the case of the integration of material parts into the organism of an existing animal, he claims that blood is formed by the activity of vital spirits. Referring the reader to Harvey's description of the early stages of the development of the chicken in the egg, he writes about the transformation of the white of the egg into blood:

Certain it is, this cannot be effected by any thing that was red before; because there is no part of the Egge of, or inclining to, that colour; and the yelk remains

²⁸ Ibid., 28; see Hippocrates *Liber de natura pueri* §21.

²⁹ Charleton, *Natural History of Nutrition*, 28–9; see Harvey, *Exercitatio de uteri membranis & humoribus*.

³⁰ Charleton, *Natural History of Nutrition*, 29–30.

intire a good while after there is blood to be seen in the *punctum saliens*. Nor is it the Fleishy parts, that communicate this vermilion tincture to the blood, because they remain white after the blood is made out of the Colliquamentum: and it is much more reasonable, that the fleshy parts derive their rednesse wholly from the blood, perpetually irrigating and washing them in its Circulation. . . . Again, nothing can have an activity, before it hath a being: and consequently the solid parts cannot give a rednesse to the blood, because they are not in being, till after the blood. Nothing, therefore, remains to be the Efficient of the Blood, but the *Vital Spirit*, kindled originally in the purest part of the seminal matter, or *Colliquamentum* which we may well denominate the *Vital Liquor*.³¹

According to Charleton, this shows that the production of blood in the process of embryo formation is not the work of already formed organs. Rather, the production of blood, like the other stages in the formation of an embryo, is characterized as the activity of vital heat and vital sprits, which in a purely combinatorial way connect homogeneous parts into an organic whole. In this sense, Charleton characterizes the formation of blood as a process of “*simple Assimilation*” and consequently the activity of vital spirits as an “*Action similar*, not organical.”³² And, in his view, this is the type of action that takes place both in nutrition and animal generation.

4. EMERGENT PROPERTIES AND THE PROBLEM OF THE ORIGIN OF MINDS

His account of the role of vital heat and vital spirits in animal generation leads Charleton to a purely materialistic view of sensitive souls, including the sensitive part of human souls. In the *Natural History of the Passions*, he characterizes the sensitive soul as “*Corporeal*, and consequently *Divisible*, *Coextense* to the whole Body; of *Substance* either Fiery, or merely resembling Fire; of a *consistence* most *thin* and *subtile*, not much unlike the flame of pure spirit of Wine, burning in a paper Lantern.”³³ For the coextension of the sensitive soul and the body, he there adduces an argument that shows that he regards passions as a result of corporeal and divisible vital spirits:

I am apt to suspect, that not only part of the Vipers Soul, but *Anger* and *Revenge* also survived in the divided head. For, it is well known, the bite of a Viper is never Venomous, but when he is enraged: the Chrystalline liquor contained in

³¹ Ibid., 40–2.

³² Ibid., 33.

³³ Walter Charleton, *Natural History of the Passions* (London: James Magnes, 1674), 5–6.

the two little Glandules at the roots of his fang teeth, being then by a copious afflux of Spirits from the Brain, and other brisk motions thereupon impress'd, in anger (of all passions the most violent and impetuous) so altered, and exalted, as to become highly active and venenate.³⁴

But he ascribes to sensitive souls not only passions but also a kind of consciousness. In this, he draws on aspects of the theory of animal cognition developed in *De Anima Brutorum* (1672) by Thomas Willis (who in turn derives his atomistic analysis of the nature of sensitive souls from Charleton's earlier physiological works).³⁵ Already in the case of lower animals, Willis holds that the animal soul has the capacity “to moderate its own faculties.” In his view, this capacity explains why the whole animal displays properties that go beyond the properties of its organic parts. Interestingly, he labels these properties as “emergent.”³⁶ Moreover, he characterizes the capacities of higher animals as “the ability to modify and to combine [action] types in their souls.” In particular, he ascribes to animal souls “the capacity to *know* about some necessary things & to be *active*.”³⁷ Nevertheless, he limits this capacity to actions determined by instinct:

Because in all these actions one thing is always performed without any variation and, what is more, in the same manner; this indicates that . . . it neither is initiated by external objects whose impulse is always varied & diverse, nor by an internal intention of the soul, which is mutable as the wind, but in fact by a more certain & fixed principle, which is always determined towards the same, which can only be *natural instinct*.³⁸

Explicitly referring the reader to Willis's work, Charleton tries to understand animal consciousness in the framework of a theory of composite action:

We are therefore to search for this *Power* of a Sensitive Soul, by which she is *conscious* of her own perception, only in *Matter* in a peculiar manner so, or so disposed or modified. But in what matter? this of the *Soul*, or that of the *Body*? Truly, if you shall distinctly examine either the Soul or the Body of a Brute, as not conjoynd and united into one *Compositum*; you will have a hard task of it, to find in either of them, or indeed in any other material subject whatever, any thing to which you may reasonably attribute such an *Energetic* and *self-moving Power*. But if you consider the *whole* Brute, as a *Body animated* . . . then you

³⁴ Ibid., 7–8.

³⁵ Thomas Willis, *De Anima Brutorum, quae hominis vitalis ac sensitiva est, exercitationes duae* (Oxford: Richard Davis, 1672). For Willis's atomistic theory of the sensitive soul, see esp. 86–90.

³⁶ Ibid., 95–9.

³⁷ Ibid., 99–100.

³⁸ Ibid., 102.

may safely conclude, that a Brute is . . . so comparated, as that from Soul and body united, such a confluence of Faculties should result, as are necessary to the ends and uses for which it was made.³⁹

Thus, animal consciousness as the capacity to perform composite actions and thus to modify action types is analyzed in terms of emergent properties that are due to the compositional structure of the organic body of an animal.

Nevertheless, in spite of the explanatory resources of an atomistic theory of sensitive souls, Charleton felt that there is something to human souls that cannot adequately be captured in terms of the causal role of vital heat and vital spirits. Recall that in the passage from the *Physiologia* concerning the role of sense perception in theory formation cited at the beginning of this essay, he claims that knowledge concerning God and the human soul is based on innate ideas.⁴⁰ Moreover, in *The Immortality of the Human Soul* one of the interlocutors in an imaginary dialogue, Lucretius, articulates Charleton's own theological concerns about the immortality of the soul: "You may remember, Sir: I told you in the beginning, that though I am an Epicurean, in many things concerning Bodies; yet, as a Christian, I detest and utterly renounce the doctrine of that Sect, concerning Mens Souls."⁴¹ Although Charleton holds on to an atomistic account of the nature and operation of the sensitive soul (including the sensitive part of the human soul), he works out arguments for the existence of an immaterial rational soul. Again, he bases his views about the nature of the rational soul on the doctrine of common notions, thus connecting some nonempiricist aspects of his epistemology with his theological concerns:

I presume it will not be accounted paradoxical in me to affirm, that Immaterial Objects are most genuine and natural to the Understanding; especially since *Des Cartes* hath irrefutably demonstrated, that the Knowledge we have of the existence of the Supreme Being, and of our own Souls, is not only Proleptical and Innate in the Mind of man, but also more certain, clear, and distinct.⁴²

Here, Charleton adopts aspects of a Cartesian epistemology to defend the idea of a second kind of common notions, a kind that is not even causally

³⁹ Charleton, *Natural History of the Passions*, 33–4.

⁴⁰ See Charleton, *Physiologia*, 18–19.

⁴¹ Walter Charleton, *The Immortality of the Human Soul, Demonstrated by the Light of Nature* (London: Henry Herringman, 1659), 185. For an account of the contemporary theological responses to atomistic theories of animal generation, see Matthew R. Goodrum, "Atomism, Atheism, and the Spontaneous Generation of Human Beings: The Debate over a Natural Origin of the First Humans in Seventeenth-Century Britain," *Journal of the History of Ideas* 63 (2002): 207–24.

⁴² Charleton, *Immortality of the Human Soul*, 119.

dependent on sense perception. He uses this kind of innate common notions to defend the immaterial and, therefore, immortal nature of the intellectual part of human souls. Like some of Gassendi's arguments for a similar view in a much shorter passage from the *Animadversiones*,⁴³ some of Charleton's arguments draw on an analysis of the structure of reflection. However, he goes beyond Gassendi's interpretation of reflective knowledge by defending an innateness thesis:

[T]he Common Notions, that are as it were engraven on our Minds, and that are not derived originally from the Observations of things by our selves, or the Tradition of them by others, do undeniably attest the contrary. Nor can any thing be more absurd, than to say, that all those Proleptical and Common Notions, which we have in our Mind, do arise only from impressions made upon the Organs of our Senses, by the incurse of External Objects, and that they cannot consist without them: Insomuch as all sensible Impressions are singular, but those Notions Universal, having no affinity with, no relation unto Corporeal motions or impressions. And . . . what kind of Corporeal impression that may be, which formes this one Common Notion in our Mind, *Things that are the same with a third thing, are the same among themselves*.⁴⁴

Subsequently, the relation of external objects to innate ideas is described as one of an occasional cause. Although innate ideas are not derived from external objects, we would not think about them without our interaction with external objects: "Not that those Objects have immitted those very Idea's into our Mind, by the Organs of the Senses; but because they have immitted somewhat, which hath given occasion to the mind to form such Idea's, by its own Innate and proper Faculty, at this time rather than at any other."⁴⁵ He explicates his views about innateness further:

[N]othing comes to the Mind, from External Objects, by the mediation of the Senses, besides certain Corporeal Impressions; and yet neither those Impressions, nor the Figures resulting from them, are such as we conceive in the Mind; as *Des Cartes* hath amply proved in his Dioptricks: Whence it follows, that the Idea's of Motions and Figures are innate to the mind; that is, that the mind hath an essential power to form them: for, when I say that such an Idea is in the Mind, I intend that it is not alwaies actually there, but *Potentially*.⁴⁶

In his view, self-referential mental activity serves as a criterion for distinguishing innate common concepts from other concepts. Whereas in

⁴³ See Gassendi, *Animadversiones*, 1:291–2.

⁴⁴ Charleton, *The Immortality of the Human Soul*, 92–3.

⁴⁵ *Ibid.*, 94.

⁴⁶ *Ibid.*

imagination, the mind is directed toward an image of a particular thing, in pure intellection, where no image is involved in the cognitive process, the mind "converteth it self upon it Self."⁴⁷ He claims that the fact that there are acts of reflection "needs no other testimony but that of a mans own Experience; it being impossible for any person living not to know, that he knows what he knows."⁴⁸ And, as he argues, the intellectual part of human souls must be immaterial because, whereas no material object can move itself, and all apparent self-motion of composite objects results from the causal interaction between their constituent parts, minds genuinely can act upon themselves.⁴⁹ In this way, the analysis of the origin of innate common notions leads Charleton to a dualistic ontology of human beings, including a dualistic ontology of the human soul.

Naturally, this dualistic conception poses serious difficulties for Charleton's views about the generation of human beings. Whereas he thinks about the generation of the human organism in terms similar to the generation of other higher animals, he would like to allow for a diverging view as to the origin of the intellectual part of human souls. What he proposes, however, is not a specific theory about the origin of minds. Rather, in the *Dissertatio epistolica* he restricts himself to criticizing existing theories, thus leaving open the possibility of divine concurrence in the generation of human souls. Interestingly, he not only rejects the theory of transference of souls from parents to their seeds defended by medical authors but also the Scholastic theory of divine *inanimatio*. To refute the Scholastic view that the soul is implanted by divine agency into the embryo at some point in its development, Charleton refers to Harvey's observations of the early stages of embryo formation in eggs. What is relevant in his eyes is the fact that Harvey showed that vital functions such as the production of a "nutritive juice" and of blood are present before a visible organic body is formed. From this he concludes,

What relates to the FIRST [the theory of divine *inanimatio*]; we say that from the most reliable observations of this great interpreter of nature, Harvey, . . . it is clear that the soul is present to the foetus from the very beginning of its conception, before any part of the body is formed, in fact even before the system of the embryo develops a plastic force of nature: therefore it is dissonant to imagine, that the soul is implanted by divine power into an already formed body.⁵⁰

⁴⁷ Ibid., 98.

⁴⁸ Ibid., 100.

⁴⁹ Ibid., 100–1.

⁵⁰ Walter Charleton, *Dissertatio epistolica, de ortu animae humanae*, published as an appendix to Walter Charleton, *Oeconomia Animalis, novis in medicina hypothesis superstructa &*

Similarly, the theory of transference is contrasted with Harvey's famous but misleading observation that in the uterus there cannot be found anything more after coitus than before.⁵¹ However, Charleton adds a more convincing discussion of the version of the transference theory of the origin of souls defended by the German physician and philosopher Daniel Sennert:

Sennert assumes that the soul is the principal efficient cause of the foetus . . . and among others he proposes the following axiom; *Whatever work or effect produces an effect that is more noble than itself, or an effect that is dissimilar to it; is not a principal efficient cause but only an instrumental one.*⁵² But given that this is true, who would not see that the seed of animals is not the primary efficient cause in the work of generation, but only an instrumental cause? Because it is easy to see that the foetus is an effect that is much more noble than the seed, and it is plainly dissimilar to it: therefore, the soul cannot be the offspring of the [male] parent, and it cannot be transmitted together with the seed into the uterus of the female parent. That the foetus is an effect that is more perfect than the seed, is obvious from the fact that art, intellect, judgment, and highest providence are apparent from its fabric; but the seed is not of a kind that art, intellect, & c. can rightly be attributed to it.⁵³

Charleton concludes that, due to the shortcomings of the transference theory of the origin of the soul, "one has to have recourse to a prior, higher, and more perfect efficient cause."⁵⁴ However, he does not try to specify further the nature of this prior efficient cause. As he points out, the requirement of an efficient cause in addition to the seed is compatible with various theories of secondary causation discussed in the sixteenth and seventeenth centuries, be it in the framework of Aristotelian theories of the ether, neo-Stoic hypotheses about an all-pervading *pneuma*, Averroistic conjectures about a universal active intellect, Neoplatonic accounts of emanative causation, or Christian ideas about divine concurrent causation.⁵⁵ Thus, he obviously, and intentionally, leaves ends loose at this point. Nevertheless, his arguments are intended to show that not only observation but also rational principles concerning the concepts of instrumental and primary cause require the existence of causal

mechanicè explicata, 3rd ed. (London: Roger Daniel, 1666), 288–290*. Charleton gives 1659 as the date of the *Dissertatio epistolica*; erroneous page numbers in the 1666 edition are marked with an asterix.

⁵¹ Charleton, *Dissertatio epistolica*, 282*–284*.

⁵² See Daniel Sennert, *Hypomnemata physica* (first edition, Frankfurt: Schleich, 1636), in *Opera Omnia*, editio novissima, vol. 1 (Lyon: Huguetan, 1676), 127.

⁵³ Charleton, *Dissertatio epistolica*, 285*.

⁵⁴ Ibid., 285*.

⁵⁵ Ibid., 287*–288*.

factors external to those inherent in the seed. And, in his view, this makes a nonnaturalistic account of the origin of minds compatible with an atomistic account of the generation of animals.

5. CONCLUSION

The interpretive strategy pursued in this essay has been to disentangle issues concerning the methodological basis of Charleton's theory of animal generation from issues connected with his voluntarist theology. What speaks in favor of such an interpretive approach is that it makes visible elements of Charleton's methodology that are significant but otherwise tend to get weighed down by his empiricist leanings. Even if there is a voluntarist theology in Charleton's early writing, and even if basic insights of British empiricism can be found throughout the development of his work on animal generation, his methodology cannot simply be reduced to an early version of empiricism. Rather, in his views on animal generation and the origin of minds, a kind of methodological pluralism is at work, some aspects of which the present essay tries to describe. Already in the *Physiologia*, the interpretation of common notions as concepts contained in our everyday way of thinking about the world goes beyond empiricism. As in the philosophy of Gassendi, these concepts are not seen as something justified by experience but rather as something first caused by the world of experience and afterwards – independently from the initial causal connection – used as a criterion of judging the truth and falsehood of propositions. Although some common notions can be said to “come from” the senses, their use as criteria of truth belongs to the realm of reason.

Charleton applies this insight to everyday concepts of generation and corruption, using them as criteria for judging the “verisimilarity” of certain philosophical accounts of animal generation. Another nonempiricist mode of reasoning can be found in Charleton's use of analogies. In this perspective, Charleton exploits the similarities between nutrition and animal generation to fill out the conceptual framework set up by common notions. As we have seen, this analogy leads him to a purely mechanistic account of the role of vital heat and vital spirits in the formation of the compositional structure of the organism.

Finally, although he explains emergent properties such as emotions and animal cognition through the compositional structure of the organism, Charleton connects the doctrine of common notions also with a version of a theory of reflection. Due to the capacity of a substance to act on itself involved in reflection, the existence of innate common notions that are not even causally derived

from sense perception, in his view, cannot be explained in the same way as an emergent property of interacting material components. His dualistic ontology of human beings, including his dualistic view of the nature of human souls, is based on this argumentative strategy. The presence of these various types of arguments substantiates the claim that the methodology behind his views on the generation of animals and human beings could be characterized as pluralistic. In particular, these argumentative strategies add to the methodology behind Charleton's theory of animal generation a type of reasoning that – without being an instance of an axiomatic-deductive method – goes beyond empiricism and eclecticism.⁵⁶

⁵⁶ I owe a huge debt of gratitude to two institutions that made work on the present paper possible. Initial research was conducted during my time as a Visiting Fellow at the Center for Philosophy of Science at the University of Pittsburgh in the academic year 2002–3. The final version was written during my time as a Visiting Fellow at the Cohn Institute for the History and Philosophy of Science and Ideas at Tel Aviv University in the academic year 2004–5. I would like to express heartfelt thanks to Adolf Grünbaum, Jim Lennox, Leo Corry, Marcelo Dascal, and Nicholas Rescher. Many thanks also to Stephanie Härtel and Justin E. H. Smith for their helpful comments on a penultimate version.