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Antoine Le Grand on the identity over time of the human body

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ABSTRACT

This paper studies Antoine Le Grand's account of organic identity over time in human bodies. In response to Aristotelian critics who argued that the Cartesian rejection of the Aristotelian ontology of matter and form had put in jeopardy the diachronic identity of material substances in general and of living bodies in particular, Le Grand argued that the identity over time of the human body could be accounted for without the traditional notions of matter and form. The paper shows how he drew on both the Cartesian metaphysics of mind and body and contemporary views on human anatomy and organic generation to develop a unique account of bodily identity over time in human animals.

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Though mostly known to specialists today, the Frenchman Antoine Le Grand (1629–1699) played a pivotal role in the reception of Cartesian philosophy in seventeenth-century England. Trained at the Franciscan college of Douai, Le Grand was sent to England as a missionary at the age of twenty-seven, where he was to spend the rest of his life.¹ In England, Le Grand soon became one of the most important advocates of the philosophy of Descartes. Thus in 1672, he published an *Institutio Philosophiae*, in which he offered an outline of a Cartesian system, and which according to his contemporary, the historian Anthony à Wood, was particularly well received at the University of Cambridge (*Athenae Oxonienses*, 620). In 1694, a revised version of this work appeared in English translation. This *Entire Body of Philosophy* laid out the principles of Cartesian philosophy in the form of a scholastic handbook, and it soon gained an eager readership of the universities of Oxford and

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¹Little is known about the details of Le Grand's biography. For brief overviews of his life and works, see Easton, 'Antoine Le Grand' and Hutton, *British Philosophy*, 235.

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Cambridge.² Indeed it is no exaggeration to state that Le Grand ‘can lay claim to being the most productive and influential follower of Descartes in England during the second half of the seventeenth century’ (Hatfield, ‘The Cartesian Psychology of Antoine Le Grand’, 252).

But in spite of the success his books evidently enjoyed during his lifetime, Le Grand was well aware that the Cartesian philosophy also had its critics. In England, one of them was the Aristotelian thinker John Sergeant. Though perhaps best known today for his attack on the Cartesian way of ideas, Sergeant in his *Method to Science* of 1696 also offered a detailed criticism of the Cartesian ontology of material substance.³ In particular, he claimed that Descartes had reduced individual bodies to mere portions of matter, and argued that, on this account, no body will survive even the least change in quantity. With every increase or decrease in quantity, after all, a portion of matter will cease to be the same portion of matter. So if individual bodies reduce to mere portions of matter, a body will cease to be the body it was with every increase or decrease in quantity. Indeed the identity of living bodies will become particularly ephemeral in an ontology of this kind, and the only way to avoid this, according to Sergeant, was by taking recourse to an Aristotelian ontology of matter and form.

In 1698, Le Grand responded to Sergeant with a *Dissertatio de ratione cognoscendi*. This work amounts to one of the most detailed defences of a Cartesian system against the criticism of Aristotelians like Sergeant, but it has so far received scant attention in the literature. The aim of this paper is to explore how Le Grand in this work addresses the problem of identity over time as applied to the human body. As we will see, Le Grand argued that recent developments in the biology of organic generation provided a key to the problem of organic identity over time in human bodies.⁴ In particular, he drew on recent work in reproductive anatomy to argue that human organisms are born with a material core that remains constant for the whole duration of their lives. It was in this core, he believed, that their bodily identity over time could be grounded.⁵

The paper proceeds as follows. In the first section below, the problem of identity over time as it was raised by Sergeant is briefly introduced. With a better understanding of the problem in place, the paper then proceed to outline the contours of the account in Le Grand of organic identity over time in human beings. The final two sections will zoom in on the way in which Le Grand

²On the strategy in thinkers such as Le Grand to organize the Cartesian philosophy in the format of the scholastic textbooks used at the time, see Ariew, *Descartes and the First Cartesians*, 201–10.

³In works such as the *Method to Science* and *Ideae Cartesianae*, Sergeant argued that the Cartesian way of ideas opened the gates to scepticism. For discussion, see Adriaenssen, *Representation and Scepticism*, chapter 6.

⁴Though not used at the time, I will for convenience use the term ‘biology’ throughout this paper.

⁵Sergeant replied to the *Dissertatio* with his *Ideae Cartesianae* of 1698. But in this work he did not revisit the problem of organic identity over time.

drew on contemporary accounts of animal generation to develop this account. As we will see, in drawing on a variety of sources, he arrived at what appears to have been an original contribution to the problem of identity over time.

1. The problem

In the *Principles*, Descartes writes that ‘the nature of matter, or body considered in general’ is to be ‘extended in length, breadth and depth’ (AT VIIA 42, CSM I 224).⁶ As his wording makes clear, what we have here is a general claim about what it is for something to be a body. What Descartes is not offering here, is a statement about what it is for something to be this or that body in particular.

And indeed it is has proven hard to answer the question of how, according to Descartes, body in general is individuated.⁷ In the *Principles*, Descartes at one point suggests that what individuates body in general, is motion:

Any variation in matter or diversity in its many form depends on motion. This seems to have been widely recognized by the philosophers, since they have stated that nature is the principle of motion and rest. And what they meant by nature in this context is what causes all corporeal things to take on the characteristics of which we are aware in experience.

(AT VIIA 52–3, CSM I 232–3)

Part of what Descartes is offering here, is an account of bodily identity at a time. On this account, x counts as a distinct body because its material parts display a pattern of motion that sets it apart from other bodies. But Descartes in these lines arguably draws the outlines of an account of bodily identity over time as well. On this account, the nature of x is a function of the pattern of motion realized by its material parts, so that it will retain the same nature for as long as this pattern of motion is preserved.

Descartes in making these claims seems to be thinking in the first place of inanimate bodies. Thus his view here seems to be that what individuates, for instance, a planet, is the pattern of motion it displays, and that it will remain the same body for as long as this pattern is preserved. But if the emphasis here is on inanimate bodies, in other places we get the impression that the identity of human bodies, too, is a function of the pattern of motion instantiated by their material parts.

Thus in one of the opening sections of the *Passions of the Soul*, Descartes compares the human body to a watch or automaton. Thanks to the mechanical interplay between their material parts, both have a physical principle of motion within themselves. This principle ceases to be present as the watch

⁶References to Descartes are to the Adam-Tannery edition of the *Oeuvres* (AT) and the English translation of the *Philosophical Writings* (CSM).

⁷This section will not aim to sort through all interpretative options. For an overview of some of the main options, see Thiel, ‘Individuation’, 225.

ceases to work, or as the body dies (AT XI 330–31, CSM I 329–30). The basic idea here seems to be that a human body is a certain configuration of moving parts,⁸ and that it remains the same body for as long as this configuration of parts in motion is preserved.

On some occasions, however, Descartes seems to suggest a rather different view. Thus in a letter to Mesland dated February 1645, we are told that for a body to count as the same material substance at two moments of time, it must be the same quantity of matter at both times. With every loss or gain of matter that takes place between these times, it ceases to be the same body:

When we speak of a body in general, we mean a determinate part of matter, a part of the quantity of which the universe is composed. In this sense, if the smallest amount of that quantity were removed, we would judge without more ado that the body was smaller and no longer complete; and if any particle of the matter were changed, we would at once think that the body was no longer ... numerically the same.

(AT IV 166, CSM III 242–3)

Few bodies will last very long on this account. Human bodies, with their continuous process of growth and renewal, would seem to be particularly short-lived.

Yet the conditions for identity over time are different for human bodies than for other kinds of bodies, Descartes explains to Mesland. The identity of a human body is determined, not by the identity of its quantity, but by its conjunction with the same soul. As long as a human body remains joined to the same soul, it remains the same body, regardless of the changes in size and shape it undergoes as it grows and ages:

But when we speak of the body of a man, we do not mean a determinate part of matter, or one that has a determinate size; we mean simply the whole of the matter which is united with the soul of that man. And so, even though the matter changes, and its quantity increases or decreases, we still believe that it is the same body, numerically the same body, so long as it remains joined and substantially united with the same soul.

(AT IV 166, CSM III 243)⁹

In another letter to Mesland, Descartes put the same point in the language of matter and form:

⁸See Hatfield, 'Mechanizing the Sensitive Soul', 170, for discussion. According to Gideon Manning, however, to think of a human body as just a configuration of matter in motion is problematic in the light of what Descartes has to say about illness. Descartes says that when a human body is ill, it is involved in a 'true error of nature', or a case where it fails to meet certain natural norms (AT VII 85, CSM II 59). But if the human body just is a configuration of matter in motion, this is problematic. For as such, the only norms to which it is subject are the laws of motion, and these are not norms from which it could in any way deviate. So if Descartes wants to say that illness involves the human body in natural error, Manning argues, he cannot reduce its nature to a mere configuration of matter in motion. See 'Descartes's Metaphysical Biology', 233–4. Also below, at note 15.

⁹The context of this remark was a discussion of the Eucharist. According to Descartes, the consecrated host is the body of Christ insofar as it supernaturally unites with the soul of Christ. On Descartes on the Eucharist, see Ariew, *Descartes among the Scholastics*, chapter 7.

It is quite true to say that I have the same body now as I had ten years ago, although the matter of which it is composed has changed, because the numerical identity of the body of a man does not depend on its matter, but on its form, which is the soul.

(AT IV 346, CSM III 278–9; See also Thiel, ‘Individuation’, 227)

With regard to bodily identity, we thus find what appear to be two different strands of thought in Descartes. In the letters to Mesland, the view seems to be that inanimate bodies lack an identity over time altogether, and that the identity of the human body is a function of its union with the soul. But in other works, the view seems to be that inanimate bodies are identified by the pattern of motion realized by their material parts, and that the identity of the human body, too, has a ground within that body itself, apart from its union with a soul.

This is not the place to decide whether and how these strands of thought can be reconciled.¹⁰ What matters for now, rather, is the way in which their presence in Descartes helps us to appreciate the controversy that would ensue later in the century, between critics such as Sergeant, and Cartesians such as Le Grand. As we will see in the remainder of this section, Sergeant associates Descartes with the first sort of view. His worry is that Descartes had denied all identity over time to inanimate bodies, and had made the identity over time of the human body dependent on its union with another, immaterial, substance. In the next section, we will see that even though Le Grand has little to say about the identity over time of inanimate bodies, he defends the Cartesian legacy by arguing that identity over time of the human body is grounded within the body itself.

1.1. Inanimate bodies

With regard to inanimate bodies, Sergeant claims that on Descartes’ account, even the slightest change in quantity will bring about a change in identity. Thus when an ageing tree increases in size, Descartes will have to say that it ceases to be the same body it was, and a young plant will become a new entity as it grows into an old tree (*Method*, 421).

In his *Metaphysics* of 1700, Sergeant repeats this point, claiming that this is a natural consequence of the identification of material substance with extension, which ‘destroys the Stability of Things’:

Hence those Philosophers are convicted of a Vast Error in one of the First Principles of Nature, who make the Essence of their First Body to consist in Nothing but Extension. For ... if Extension be the Essential Constitutive of that Matter of theirs ... then Difference in Extension, or more and less of Extension, must essentially constitute Distinct Things under the Notion of Body, or Distinct Bodies: By which Doctrine, no Man living, nor perhaps any Body in Nature, while it

¹⁰For some discussion, see Rodis-Lewis, ‘Limites du modèle mécanique’, 158–60, and Hatfield, ‘Mechanizing the Sensitive Soul’, 170–1.

continually sends out it's Particles or Effluvioms, would be the same Body, or the same Thing, one single moment: Which quite destroys the Stability of Things.
(*Metaphysics*, 38)

According to Sergeant, the only way to avoid this outcome is to think of a body as a compound of matter and substantial form, and to think of quantity as an accident that inheres in this compound. On this account, the matter of a body is the material substrate that makes it a body, while its substantial form is what gives it a determinate identity and makes it this or that body in particular.¹¹ Its quantity is the accident that gives it a particular size. Thus the ontological structure of a large body comes out as in [Figure 1](#).¹²

When a body changes in size, on this account, this comes out as a mutation on the level of the accidental form that determines its quantity. The underlying form that fixes its identity, however, endures:

Tis manifest then that here is a Real Divisibility between its Quantity and its Entity or Substance, and a Real *Mutation* according to the *Form* of the Quantity, and not according to the Notions of *Ens* or *Thing*.

(*Method*, 421)

To do justice to the intuition that a body can remain the same thing even as its size changes then, we need to take recourse to the Aristotelian notions of matter and substantial form, and resist the Cartesian reduction of material substance to extension in three dimensions.¹³

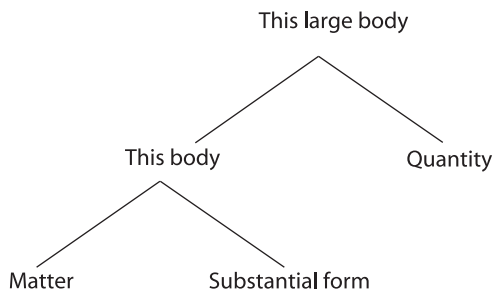


Figure 1. The ontology of material substance according to Sergeant.

1.2. Human bodies

The problem, faced by Descartes, that bodies do not survive changes in quantity, according to Sergeant applies with equal force to the case of the human body. The identity of the human body seems to vary as it grows and ages. To

¹¹The substantial form of a body is 'that which so determines it as to constitute *This* or *That* body in particular'. See his *Metaphysics*, 12 and 107.

¹²I am indebted to Brower, *Aquinas's Ontology*, for this mode of representation.

¹³For more on Sergeant's notion of form, see Adriaenssen and de Boer, 'Between Atoms and Forms', section 5.

be sure, Sergeant knows that 'our late Philosophers will hope to evade this last Instance by alledging that the Numerical Identity of a Man springs from his having the same *Soul*'. But this evasion is 'Unreasonable and ill grounded', and the identity over time of the human body is at jeopardy no less than that of the young plant that grows into a large tree (*Method*, 421).

At first glance, Sergeant's comments look remarkable. After all, in his own view, as we have just seen, the form of a body is that which grounds its identity. Now following philosophers such as Thomas Aquinas, according to Sergeant the human soul is the form of the human body (*Method*, 411). On his account then, it would seem that a man's soul or form is what grounds the identity of his body. But that does not seem so different from Descartes when he writes that the identity of a human body is determined by its form or soul. So what is the real disagreement between Descartes and his English critic here?

It is a point of debate in the secondary literature what we are to make of Descartes' claim that the soul is the form of the body. According to Paul Hoffman, for instance, it reveals a genuine indebtedness of Descartes to his scholastic teachers and predecessors ('Union and Interaction'). According to Marleen Rozemond, however, it is not at all clear that the Cartesian soul can indeed function in the way Aristotelian forms did. An Aristotelian form, she argues, made a body the kind of body that it was by making it move and behave in ways that are characteristic of it. But the Cartesian mind does not constitute the human body in this way. The body is a machine that does not need a soul to move and to behave as a human body. Its identity as a human body then, seems independent of its union with the soul, which it could not be if the soul genuinely served as its form (Rozemond, *Descartes's Dualism*, 139–71).

It is beyond the scope of this paper to assess the merits of these readings. For now, it suffices to note that Sergeant, too, questioned whether the soul as Descartes understood it can really function as a form that fixes the identity of its bearer. According to Sergeant, whatever determines the identity of a body will have to be intrinsic to that thing. Hence, given that what determines the identity of a body is its form, the form of a body will need to be something 'Intrinsic to the Thing'. Yet the Cartesian mind is 'a Distinct Thing from the Body', and mind and body operate independently of each other. And it follows from this 'Extravagant Tenet' that the soul of a man cannot genuinely identify his body in the way of an Aristotelian form (*Method*, 420).

2. Le Grand

Le Grand has little to say about the identity conditions of inanimate bodies. In the *Entire Body*, we are told that 'the whole *Difference* of *Bodies* doth depend on the Modification of their *Parts*' (*Entire Body*, part 1, 107). Thus the identity of a body is a function of the inner structure of its parts, which sets it apart from other bodies. But if the identity of a body is a function of the inner structure of

its parts, it seems a body will remain the same for as long as this inner structure is preserved. Even if the issue of identity over time with regard to inanimate bodies is not raised with so many words then, we do get the suggestion that it is their structural properties that make it possible for such bodies to endure over time.

Le Grand had much more to say about human bodily identity over time, which is a topic that, as we will see, for him touches upon theological matters such as the resurrection of the same body. As he looked for ways to anchor the identity over time of the human body, it seems Le Grand departed from Descartes in a number of ways. Thus where Descartes had written to Mesland that the 'numerical identity' of the human body depends on its union with the soul, Le Grand did not think so. Indeed he denied the claim in his opponent that modern Cartesians like himself had made the identity of the human body depend on its union with the immaterial soul:

And so he is in error when he supposes that for the Cartesians it is the soul itself that constitutes the principle of numerical individuation.

(Dissertatio, 128)

Moreover, whereas the Mesland correspondence denies that 'there is any particle of our bodies which remains numerically the same for a single moment' (AT IV 167, CSM III 243), Le Grand finds it plausible that there is a kind of material core in the human body that remains constant from birth to death.¹⁴ The presence of this core, he believed, helped to understand how a body that changed in so many ways, yet remained the same substance for the whole duration of its life.

In the remainder of this section, we will take a closer look at these two points. First, we will explore in some further detail the claim in Le Grand that the identity over time of the human body is not a function of its union with the same soul. We will see that although this claim may mark a departure from Descartes in one regard, at the same time Le Grand draws on Descartes in a number of ways as he develops his claim. Second, we will turn to the suggestion that the human body has a material core that remains constant for the whole duration of its life. As we will see, this idea in Le Grand is best appreciated when placed in the broader context of contemporary accounts of organic generation and development.

2.1. Dispositions and identity over time

In the *Dissertatio*, Le Grand argues that human bodies have a 'disposition', or aptitude, to be united with the soul:

¹⁴This seems to be typical of human bodies, and maybe living bodies in general. Le Grand never offers a similar suggestion with regard to inanimate objects, however.

The whole essence of the human body consists in its particular disposition to receive a human soul. And the particular essence of any given body, such as the body of Peter, consists in the particular disposition by which it is made fit to receive his soul.

(*Dissertatio*, 119)

Le Grand makes two claims here. The first is that, in general, human bodies have a disposition to be united with a soul. The second is that, for each particular human body, there is a soul such that the body has a disposition to be united with that soul. And with these claims he thinks he can answer the charge in Sergeant that the Cartesians leave the human body without an intrinsic identifier. For what identifies a body as a human body, on this account, is the way in which it is disposed for union with a human soul. And what identifies a human body as this human body, is the way in which it is disposed for union with this human soul.

Now for this proposal to work, it needs to become clearer just what these dispositions amount to. So let us look at Le Grand's two claims one by one, starting with the claim that human bodies are disposed for union with human souls. To develop this claim, Le Grand draws on Descartes. For Descartes too believed that human bodies are disposed, or fit for, union with a human soul in a way that not all bodies are. As mentioned, in one of the opening articles of the *Passions of the Soul*, we are told that, to unite with a soul, a body needs to have a determinate material organization. In particular, it is necessary that it have an inner source of heat, as well as a certain organic structure. The moment these stop to be in place, the body ceases to be disposed for union with a soul, and the soul will take its leave:

It has been believed, without justification, that our natural heat and all the movements of our bodies depend on the soul; whereas we ought to hold, on the contrary, that the soul takes its leave when we die only because this heat ceases and the organs which bring about bodily motion decay.

(AT XI 330, CSM I 329)

Of course, this raises the question of why the decay of the organic structure of the body should cause the soul to leave, or what it is about this structure that makes the human body fit for union with a soul.

Descartes does not explicitly address this question, but according to Fred Ablondi, the discussion of sensory cognition in the Sixth Meditation may help us to see in what way the organic structure of the human body makes it fit for union with a soul. Sensory cognition, we are told in the Sixth Meditation, is special in two ways. First, it is a mode of cognition that depends on the union of the soul with a body. The soul can reason and entertain concepts without the help of a body, but it needs a system of nerves and tissue in order to engage in the sensation of colours and smells. Second, contrary to other modes of cognition, the use of sensation lies not in giving us a veridical grasp of external

objects, but rather in indicating to us which objects are harmful, and which are beneficial to the survival of the body (AT VII 83, CSM II 57).

According to Ablondi, this helps us to understand in what sense the organic structure of the human body makes it fit for union with a soul. Its organic structure makes the human body fit for union with a soul, in the sense that it is useful for a body with such a structure to be united with a soul. Its organic structure makes it useful for the body to unite with a soul, insofar as it will enable the soul to engage in acts of sensation that help to protect the body against potential damage.

This also helps to understand why the soul leaves the human body as its organs begin to decay.¹⁵ With the decay of its organic structure, the body ceases to be the kind of system that supports the sensory activity that protects it from harm, and mind–body union ceases to have the use it formerly had. As Ablondi puts it, with the decay of the organic structure of the body, there no longer is a ‘need or purpose’ served by its union with the immaterial soul (‘Death According to Descartes’, 50).¹⁶

If this is a point that remains implicit in Descartes, it is made somewhat more explicit in Le Grand’s *Dissertatio*. Only a body that displays a certain degree of complexity and organization is fit for union with a human soul, we are told there. And the reason that only bodies of this kind are fit for union with a soul, is that it is in bodies of this kind that souls can function within the kind of warning systems Descartes had described in the Sixth Meditation:

The mind is united, not with a body that is an inert and continuous mass, but with a body that is built up out of various parts that are ordered so skilfully that, when they are put in motion by each other and by external causes, they can with the help of the nerves transmit this impulse to the brain, whereby, once it has been reported to the soul, various internal as well as external perceptions follow, in virtue of which we come to know better, not only our own bodies and the many affections in them, but also external things, and which of these are beneficial to us, and which are not.

(*Dissertatio*, 45)

What makes our bodies disposed for union with a Cartesian soul, is that they have an organic structure that supports a cognitive modality that demands for the mind to be embodied, and then allows it to function as a kind of support or survival system for the body itself.

¹⁵Descartes seems to think of this decay as a process where the body no longer succeeds in meeting a certain natural norm. But if all there is to a human body is a certain portion of matter in motion, it is not clear that there is a natural norm it could fail to meet. On this ground, Manning has argued that according to Descartes, the human body can be viewed in two ways: as (a) a mere body or a portion of matter in motion, or as (b) a person’s body, or an integral part of a mind–body union. But the nature of (a), he argues, is different from that of (b). In particular, the nature of a person’s body does, but the nature of a mere body does not, specify norms of well-being it may fail to meet (‘Descartes’s Metaphysical Biology’, 224–9).

¹⁶In spite of his rejection of teleological explanations in natural philosophy, Descartes appears to have been happy to allow that the senses serve a purpose in the contribution they make to the survival of the body. For a helpful discussion, see Simmons, ‘Sensible Ends’.

What about the second claim Le Grand makes, according to which a given individual body has a disposition for union with some given individual soul? Again Le Grand likely was drawing inspiration from Descartes here. For in a letter to Mesland dated 1645 or 1646, Descartes had written that, even though the body of Christ in the sepulchre had been separated from its soul, it remained the same body because it retained a disposition for union with the soul of Christ (AT IV 347, CSM III 279). This idea, which is only briefly mentioned in the Mesland correspondence, becomes the cornerstone of Le Grand's account of human bodily identity. Moreover, it becomes detached from the suggestion, also to be found in the Mesland correspondence that the identity of the body is due to the soul it unites with. For Le Grand, independently of whether or not it is actually united to a soul, a human body is the body it is for as long as it remains disposed for union with some given soul.

But what does this disposition consist in? Here, Le Grand briefly considers the possibility that, for each nervous system and brain, there is a soul with fitting, or corresponding rational capacities. But he has little patience with this suggestion. All souls are born equal in regard of their rational capacities, he argues, and this rules out the idea that human bodies are coupled with souls whose cognitive abilities somehow match the brain power of these bodies (*Dissertatio*, 129). Having made this negative point, however, Le Grand does not go on to tell what does constitute the disposition an individual body has for union with a given soul. Instead, the idea that each human body is disposed for union with some one soul is treated as a given that does not permit further analysis.

Now quite apart from the question of how plausible it is to say that human bodies are fit for union with particular souls as a matter of primitive fact, it seems clear that as a response to someone like Sergeant, who wants to be shown that bodily identity over time can be accounted for in a meaningful way without resorting to the Aristotelian notions of matter and form, this is too meagre. And part of what this means, is that when it comes to answering his Aristotelian critic, it seems that most of the weight will have to be carried by the idea in Le Grand that all human bodies are born with a material core that remains constant for the whole duration of their lives. The next two sections will explore this idea, and place it in the broader context of early modern accounts of organic generation.

3. Preformation and continuity

Descartes' account of animal generation is a special case of his general account of the generation of bodies. In this general account, bodies are built up out of inherently inert particles of matter. These particles move and cluster in accordance with a few simple laws of nature and so become the building blocks of the bodies and materials that we see around us.

In the special case of animal generation, what Descartes called ‘seminal particles’ from both parents combine in the uterus. There they move and cluster in accordance with the laws of nature, and the clusters that are so formed become the vital organs of the new animal. According to Descartes the organ to develop first in this way from a cluster of particles is the heart. With the heart in place, particles will continue to cluster, and other organs will develop one after the other to build up a new animal of the same species as its parents (AT XI 253–7, CSM I 322–4).¹⁷

This account of animal generation, however, commanded little support, even from Descartes’ own followers. Nicolas Malebranche, for instance, argued that it was impossible for organisms to develop in the kind of piecemeal way Descartes had envisioned, one organ after the other. According to Malebranche, the unique complexity of organic bodies consists in the way in which every organ depends on all the others:

An organized body contains an infinity of parts that mutually depend on one another in relation to particular ends, all of which must be actually formed in order to work as a whole.

(OCM II 343–4, LO 465)¹⁸

No part of an organic body can ‘live alone’, that is. And part of what that means, according to Malebranche, is that we must not think of organs as individual units that could develop before the others are in place:

It would be wrong then to pretend to explain the formation of animals and plants and their parts, one after the other.

(OCM II 343–4, LO 465)

The parts of an organic body, in other words, must be formed all at once, not one after the other. But the clustering of particles as regulated by the laws of motion, according to Malebranche, could only ever lead to the piecemeal production of parts one after the other. So if animals are produced all at once, he concluded, animal generation cannot be explained in terms of the simple clustering of particles as regulated by the laws of motion (OCM II 343, LO 465).¹⁹

On his own account of animal generation, the reproductive system of a female animal contains eggs that, even before conception, contain the complete organic structure of their offspring. The union of these eggs with the male semen, in this account, is not what leads to the step by step development of an organic system, but merely serves to enable the complete structure already contained in the egg to expand, and to grow into a viable

¹⁷For detailed discussion, see Duchesneau, *Modèles du vivant*, 72–82.

¹⁸References to Malebranche are to the Robinet edition of the *Oeuvres complètes* (OCM) and, for the *Recherche*, to the translation by Lennon and Olscamp (LO).

¹⁹For discussion, see Detlefsen, ‘Biology and Theology’, 150–5.

foetus. This idea, according to which the organic structure of offspring is present before conception, is known as *preformation*.

Malebranche defended a particularly strong version of this idea. On this version, the first females of a species are created directly by God as complete wholes. In particular, they are created with eggs that already contain the organic bodies of the members of the next generation. And because the female members of the second generation also contain the organic bodies of the third and so on until the last members of the species, this means that the first females of every species are created in such a way that the organic bodies of the whole of their offspring are already contained in them:

We ought to accept, in addition, that the body of every man and beast born till the end of time was perhaps produced at the creation of the world. My thought is that the females of the original animals may have been created along with all those of the same species that they have begotten and that are begotten in the future.

(OCM I 82–3, LO 27)

This strong version of the general idea that organic structure precedes conception, is sometimes referred to as *pre-existence*.²⁰

Preformation in general, and pre-existence in particular, have for a long time had a poor reputation among historians of science.²¹ Yet Malebranche was by no means the only one to doubt whether complex organic structures could be the result from the mere clustering of particles as guided by the laws of motion,²² and his theory of pre-existence was soon to find its way to the Cartesian handbooks, including that of Le Grand. Like Malebranche, indeed, Le Grand held that animals are formed all at once, and are not built up piecemeal as minute bits of matter stick together:

Our modern *Philosophers* believe that all *Vegetables* are formally contained in their *Seeds*, and that they are not formed by apposition of *parts* as *Stones* and *Metals* are, but at once and all together like perfect *Animals*.

(*Entire Body*, part 2, 167)

In particular, Le Grand agreed with Malebranche that it was God who had created the first females of each animal species as complete wholes, in which the organic structures of all future members of the species pre-exist (*Entire Body* part 2, 167 and part 1, 272). But Le Grand then went beyond what was to be found in Malebranche, and claimed that this idea could be used, not only to account for organic generation, but also to provide an account of organic identity over time (*Dissertatio*, 120–1).

At first glance, it is not at all obvious how preformation could provide a key to the problem of organic identity over time. After all, preformation is a claim

²⁰On the distinction between preformation and pre-existence, see Roger, *The Life Sciences*, 259–60. Also Smith, *Divine Machines*, 170.

²¹See the discussion in Pinto-Correia, *The Ovary of Eve*, 8–10.

²²For helpful discussion, see Pyle, 'Animal Generation', 233–6.

about the origin of organisms, not about their endurance in time. And even if it is true that offspring is contained as a kind of miniature in the maternal egg, that does not take away that as the miniature grows and unfolds, it becomes subject to the same material flux of material parts that first gave rise to the question of how to account for organic identity over time without forms. So how could Le Grand think that the biology of preformation provides a key to the problem of organic identity over time?

To answer this question, it will be helpful to look at some of the sources on which he drew in developing his account of animal generation. The first of these sources that we need to look at, is Jan Swammerdam. This Dutch biologist was one of the most important sources of early modern preformation theory, and both Malebranche and Le Grand cited his work in support of their accounts of animal generation.²³ Now as we will see below, the topic of identity over time was closely linked to the notion of organic preformation in the work of Swammerdam. To be sure, the problem of organic identity over time for Swammerdam arose in a specific context, and in that context, the question of how organic bodies survive what seems to be the constant flux of matter was not the central issue. Even so, the case of Swammerdam is a helpful reminder that for Le Grand to link the problem of organic identity over time to organic preformation would not have been as unexpected in the seventeenth century as it may be to some of us nowadays.

The second source we need to turn to, is the Irish thinker Bernard Connor. A medical doctor by training, Connor was the author of an *Evangelicum medici* in which he set out to provide physiological accounts of such tenets of faith as the virgin birth of Jesus, and the resurrection of the body at the last judgement.²⁴ It was in connection with the second of these that Connor offered a general account of how organic bodies remain the same over time. As we will see, this account tied the general idea that animals develop from pre-formed structures to the further claim that they are born with a material core that stays with them unaltered for the whole duration of their lives. As will become clear, even though Le Grand disagreed with Connor on a number of points, he embraced the idea that animals are born with a constant material core, and gave it a prominent role in his own account of organic identity over time.

3.1. Harvey and Swammerdam

In 1651, the English biologist, William Harvey, had published his disputations *De generatione animalium*. In that work, he drew a distinction between two general models of animal generation. The first was what he called epigenesis.

²³For Malebranche, see OCM I 83 and OCM XII 231. For Le Grand, see below.

²⁴On Connor's life and work, see Stone, 'Connor, Bernard'.

In epigenesis, an animal emerges step by step as its members develop one after the other from a portion of matter that initially lacked an organic structure. Thus a chicken emerges step by step as its members develop one after the other from the matter of the egg and according to Harvey, this kind of epigenetic development was typical of the higher animal species.²⁵

The second model of animal generation was what he described as generation by metamorphosis. When an animal is generated in this way, its members emerge all at the same time from a portion of matter that previously lacked this organic structure in a process Harvey likened to the imprint of a seal in a piece of wax:

In generation by metamorphosis creatures are fashioned as it were by the imprint of a seal, or cast in a mould, that is the whole of the material being transformed.

(*Generation of Animals*, 203–4)

This mechanism of generation Harvey took to be characteristic of the lower animal species, and of insects in particular. Thus when a caterpillar emerges from an egg, Harvey believed this is a process of metamorphosis in which the organic structure of the caterpillar is as it were impressed upon the matter of the egg so as to generate a new animal (*Generation of Animals*, 327). And the same mechanism is at work as, eventually, the caterpillar develops into a butterfly. What happens here, in Harvey's view, is that a new organic structure is as it were imprinted upon the matter of the caterpillar so that the latter ceases to be, and a butterfly comes into existence:

In the generation of those animals which are framed by metamorphosis ... all the parts are sketched out and separated by transformation from pre-existent material which has been sufficiently increased and prepared, as when a butterfly is made out of a caterpillar.

(*Generation of Animals*, 266)

Swammerdam admired Harvey, but found his account of insect generation by metamorphosis to be fundamentally flawed. To see why, we need to briefly turn to his influential treatise on insect classification and generation, the *Historia generalis insectorum* of 1669.²⁶ There Swammerdam described an experiment in which he had dipped a caterpillar in a portion of very hot water. As he repeated this experiment, he explained, the caterpillar's outer layers of skin would gradually come loose, and lay bare the 'essential parts' of a butterfly (*Historia insectorum*, part 2, 43). The conclusion he drew from this was that, far from being a new animal that replaces the caterpillar in a process of metamorphosis, the butterfly is but the caterpillar itself in a later stage of development:

²⁵On Harvey on animal generation, see Pagel, *William Harvey's Biological Ideas*, 233–50.

²⁶The work originally appeared in Dutch, and was translated into French in 1682. A Latin translation appeared in 1685, followed by an English translation in 1758.

The caterpillar is the butterfly itself, but as it were covered in a robe that prevents its parts from making themselves known.

(*Historia insectorum*, part 2, 45)²⁷

Much the same can be said of the egg at the beginning of the life cycle. For just as the seed of a bean plant already displays the outlines of leaves and sprouts, Swammerdam argued, the organic outlines of the butterfly could already be discerned in the egg from which it would develop (*Historia insectorum*, part 1, 64). And this provided further evidence against metamorphosis as described by Harvey. For if the egg from which it will develop already contains the organic outlines of the butterfly, he reasoned, this must mean that the egg is but the butterfly itself, albeit in an early stage of development: 'we find that the egg is the little animal itself' (*Historia insectorum*, part 2, 30). From egg to butterfly via caterpillar then, we are dealing with what could be termed a developmental continuum, in which a single organism goes through a series of developmental stages. Nowhere is this continuum interrupted by metamorphoses in which one organism is replaced with another.

Of course, if the egg already contains the organic outlines of the animal that will emerge from it, this raises the question of the origin of these organic outlines in the egg. In particular, it raises the question of whether according to Swammerdam the presence of these organic structures in the egg predates the moment of conception. Now according to Peter Bowler, Swammerdam performed his experiments on fertilized eggs only. Hence whatever structure he discovered in the egg, his findings would not have produced empirical support for the preformationist position that organic structure in the egg predates conception (Bowler, 'Preformation and Pre-existence', 234).

But according to Edward Ruestow, when Swammerdam wrote that eggs already contain the organic outlines of the animal that will develop from them, he took this to mean that eggs display this organic structure even before conception (*The Microscope in the Dutch Republic*, 242–3). And this seems correct. For with regard to the egg that is identified as an insect in the first phase of development, we are told that it exists before its female parent has grown into a mature insect capable of reproductive behaviour. In particular, we are told that it exists as early as in the larval state that precedes the maturity of its parent (*Historia insectorum*, part 2, 30).

To say that organic structure predates the moment of conception is to adopt some form of preformation. And in fact, Swammerdam was happy to

²⁷The caterpillar is the butterfly itself, insofar as the basic organic structure of the butterfly can be discerned as early as in the larval stage. The fact that this basic structure was present from the larval phase onwards, however, did not mean that the butterfly would remain unaltered from first to last phase of development. On the contrary, Swammerdam provided detailed descriptions of the many changes that insects undergo as the basic outlines of their organic structure is as it were fleshed out, and grows into maturity. See also Fournier, 'The Book of Nature', 22.

speculate about full pre-existence in this connection (*Historia insectorum*, part 2, 30–1). For having claimed that eggs are but animals in an early phase of development and that eggs are present in their female parents even before they are capable of reproductive behaviour, he went on to claim that this provided support for an idea he had put forth earlier (in *Historia insectorum*, part 1, 51–2): the idea that all animals pre-exist in their female parents, and that the whole of a species is in a way contained in its first female member.

Finally, even if Swammerdam may have been led to speculate beyond his observations here, it seems clear that the basic idea that organic structure predates the moment of conception ties in neatly with the overall tenor of his response to Harvey. For it seems that in the spirit of Harvey, one could think of fertilization as a moment in which organic structure is as it were imprinted upon an egg that up to that moment lacked such structure. But if his view is that organic structure predates the moment of conception, Swammerdam will be able to resist this notion of conception as the biological analogue of the imprint of a seal on an as yet figureless piece of wax. Indeed at one point, he suggests that the role of conception is in some way to support, but not to bring about, the organic life that is already present in the egg:

When the male power is received in the female parent, the life, motion, and sensation that is already in the female egg is perfected and made to endure.

(Historia insectorum, part 1, 64–5)

In the work of Swammerdam then, preformation theory seems to have served as a bulwark against metamorphosis. It was that which made it possible to see the life cycle of an insect from egg to butterfly as a seamless continuum that was nowhere interrupted by a metamorphosis replacing one organism for another. Preformation meant that the same organic structure endures from the egg before conception to the mature insect, and as such it led to the view of a single animal that endures over time, and manifests itself, first as an egg, then as a caterpillar, and finally as a mature insect.

3.2. Connor

Following a long tradition going back to Galen, Connor identified the human ovaries as female testicles contributing seed to generation. This female seed, he believed, already contained the organic structure of the organism that would develop from it well before conception:²⁸

Just as the seed of silkworm or a grain of wheat contain in themselves another silkworm or grain with their seeds, thus every membranous capsule of the female seed contains in itself all the parts of a human body, for long before

²⁸Connor made it clear that it was God who had endowed the seed with this organic structure. But whether God had created all organic structures at the beginning, or rather intervened in creation to imprint organic structures in animal seeds, was a question he left open. See *Evangelium medici*, 103–4.

the intercourse of man and woman all of the stamina and rudiments of our body are formed and ordered in the right way and lie hidden in this prolific liquid.
(*Evangelium medici*, 96)

To see how Connor gets from this claim to the claim that the same matter endures from this first stage of life onwards, we need to take a closer look at the concept of stamina here.

In classical Latin, the noun *stamina* that Connor uses here had referred to the warps in a loom, under and over which other threads are woven to produce a piece of cloth. But in the early modern life sciences, stamina had also become a common image for the primordial fibres of organic bodies. Thus according to the Renaissance physiologist, Jean Fernel, organic bodies developed from seeds that had an inner structure of fibres that functioned much in the way of the warp threads in a loom. They provided a basic sketch of the body that would develop from them, which would then be filled out as the seed matured in the maternal womb and 'blood oozed over it, wrapped the filaments and warps all around, and kept congealing' (Fernel, *Physiologia*, 279).²⁹

In the seventeenth century, similar claims were often put forth in the context of preformationist accounts of animal generation.³⁰ Thus according to the Aberdeen church minister, George Garden, the paternal seed contains stamina that provide a basic sketch or outline of the organism that will develop from it. After conception, these stamina begin to expand, and it is with this expansion that the seed step by step develops into a viable foetus (Garden, 'Discourse Concerning the Modern Theory', 477). What we call animal generation, then, in reality is not so much the emergence of a new organism, as the stretching out of fibrous structures that had existed within the male seed even before conception.

According to Connor, as we have seen, it is the female seed that contains the stamina of future offspring, but his account of animal generation is otherwise similar to Garden's. Thus like Garden, he believes that the stamina in the seed provide the basic outlines of the human body that will develop from it. What happens in conception, is that the 'seminal ferment' of the male enters the pores of the stamina, causing them to dilate and grow larger' (*Evangelium medici*, 98). Indeed the process of development from seed to viable foetus, for Connor, mostly consists in the expansion of the stamina that had been provided by the female seed:

The generation of all animals (and indeed the development of plants) does not consist in the formation of new Organs or parts. Rather, it only consists in this, that the seminal fermentation of the male causes the stamina that are already delineated in the seed, and which exist in a compact way, to expand, and to become fit to take in more food and to grow more.

(*Evangelium medici*, 101)

²⁹See also Pagel, *William Harvey's Biological Ideas*, 239, for further references.

³⁰For discussion, see Ishizuka, 'The Concept of Fibre', 563, 577–9.

With this account of animal generation in place, Connor thinks he can address the problem of bodily identity over time.

For as the rudimentary stamina in the mother's reproductive organs expand, he maintains, they grow without perishing: 'the primordial stamina of the child, from birth to death, endure entire, unchanged, and the same' (*Evangelium medici*, 143). At least most of them remain intact for the whole duration of our lives, and it is the material continuity at this level that gives our bodies a material identity over time:

As it is clear that, if perhaps not all, then at least most parts of the stamina of our bodies remain intact from youth to old age, our bodies remain the same for the whole course of our lives.

(Evangelium medici, 147–8)

In Connor's version of preformation then, it is not just the organic outlines of an animal that endure from before conception up to maturity, but also the material that first constituted these outlines.

Connor used his theory, not only in the biological context of animal and plant generation, but also as a key to the theological problem of the resurrection of the body. According to 1 Corinthians 15, our bodies shall rise again at the end of times to reunite with our souls. But ever since Augustine, the interpretation of this promise had been a matter of debate.³¹ For as we age, our bodies change in size and shape, and it is not obvious that the infant body of a man is the same body he had at the age of thirty, or when he died at old age. So which of these is the body his soul will unite with at the end of times? According to some, it was the body he had at the end of his life. But according to others, it was the body he had as a man of thirty that will rise again at the end of times.

According to Connor, what will rise again at the end of times is precisely that in virtue of which the body a man had as a child is the same as the body he had at the age of thirty, or when he died at old age. Indeed according to him, at the end of times, the soul of a man will reunite, not with the body he had at any given stage of his life, but only with the core of stamina that had remained with them from the earliest stage of development onwards (*Evangelium medici*, 154). As we will see, Le Grand will arrive at much the same conclusion as he draws on Connor to account for organic identity over time in terms of preformed stamina.

4. Le Grand and Connor

Le Grand read the *Evangelium medici*, and thought highly of its author.³² Indeed as we will see, he took up the idea in Connor that human bodies develop from a fibrous core of stamina, and combined it with some of the

³¹For an overview of the debate, see Strickland, 'Resurrection of the Body'.

³²Connor is introduced in the *Dissertatio* as a 'Medicus Eximius' (*Dissertatio*, 122).

most recent findings on female reproductive anatomy. And like Connor, he believed that this common core of stamina provided a material ground for organic identity over time.

4.1. Eggs and fibres

Le Grand begins his account of animal generation in the *Dissertatio* with an endorsement of the work of recent anatomists who had argued that what had traditionally been identified as female testicles, in reality, were ovaries:³³

With regard to the appearance and natural fabric of the human body, we follow the famous anatomist Steno, who discovered that what were commonly called the female testicles were ovaries, which Van Horne, Kerckring, and De Graaf and others have made manifest as well in their writings. So that it is commonly maintained nowadays that the foetus is hidden in these ovaries with all of its parts.
(*Dissertatio*, 120)

Le Grand was correct that, according to the men named here, human females contribute eggs to generation no less than oviparous animals like birds. However, his claim that 'it is commonly maintained nowadays that the foetus is hidden in these ovaries with all its parts' needs to be handled with some care.

Le Grand's claim here is correct insofar as, according to the authors he cites, human eggs contain at least the rudiments of organic structures at a very early stage. Thus in his account of the human ovum, the Amsterdam physician and anatomist, Theodore Kerckring, describes how he is called upon to establish the cause of death of a young woman, and lays open the body to find in the uterus a roundish mass the size of a black cherry. Reasoning that this little globule has to be a human ovum in an early stage of development, he seeks permission from the husband to subject it to further investigation, and finds that, even in this early stage, the mass contained in the egg already reveals what is at least the global shape of a human body:

I find that nature, which is diligent and never idle, has in merely three or four days already moulded some shape in the rudiments of a man, in which the head can be clearly discerned from the mass of the body, and in the head of which you will see as through a fog the marks of its organs.
(*Anthropogeniae ichnographia*, 4)

But if a human egg in the third or fourth day of gestation already contains the rudiments of a viable foetus, Kerckring never claimed to have observed such rudiments in an egg before it had left the ovary. Indeed, there are no indications in his work to suggest that, before ovulation, 'the foetus lies hidden with all of its part' in the ovum.

³³On the discovery of the human ovaries, see Adelman, *Marcello Malpighi*, 780–1.

The same appears to hold for the other authors Le Grand mentions. Thus according to De Graaf, embryonic development was an epigenetic process, in which organic parts develop one after the other. Indeed he approvingly cites Harvey's account of chick development according to which the organic structure of the embryo is built up step by step starting with the development of a primordial heart from a red spot in the egg, and argued that embryonic development in other species proceeds in similar ways (De Graaf, *De mulierum organis*, 265–6). De Graaf himself provided a detailed account of embryonic development in rabbits, and found that it took up to ten days for the rudiments of a foetus to appear in the egg after it had entered the uterus (*De mulierum organis*, 308–21). The idea that a mammalian foetus could lie hidden in the ovary with all of its parts, finds no support in his work.

When Le Grand wrote that 'it is commonly maintained nowadays that the foetus is hidden in these ovaries with all of its parts', it appears he was reading the anatomists cited above through the lens of Swammerdam. Indeed their work had been discussed in detail by Swammerdam in his *Miraculum naturae*.³⁴ But in that work, Swammerdam had not only endorsed their findings on the role of the female ovary in reproduction, but had proceeded to tie the notion of a female ovum to that of pre-existence. Thus according to Swammerdam, the first woman had been created by God with eggs that contained the organic outlines of all members of the second generation of the human species. And since the female members of that generation already contained the organic outlines of the members of the third, and so on until the end of mankind, the ovary of the first human woman had in a sense contained what were at least the organic rudiments of the whole of mankind (see *Miraculum naturae*, 22. Also *Historia insectorum*, part 1, 51–2).

Le Grand embraced this view, and like Swammerdam employed it as an account of the transmission of original sin. For insofar as they had been encased in the ovary of Eve, he argued, the bodies of all human beings must have been affected in some way by her sin:

Because all Men that ever were, or shall be, were hid in the Loins of *Adam* and *Eve*, to whom therefore it may be easily conceiv'd, that that primordial Taint must have been necessarily propagated from these their *First Parents*.

(*Entire Body*, part 1, 272)³⁵

But if this view provided a key to the transmission of original sin, Le Grand also believed it could be used to formulate an account of bodily identity over time. And to do so, he harked back to Connor's account of primordial stamina, which he detached from the latter's notion of female seed.

³⁴Swammerdam claimed that De Graaf in his *De mulierum organis* had failed to credit their teacher, Jan van Horne, and himself for their findings on female reproductive anatomy.

³⁵The same view can be found in *Miraculum naturae*, 22.

4.2. *Stamina and identity over time*

For Connor, material identity was a necessary requirement for bodily identity over time: something is the same body at two moments of time only if materially the same stamina are present at both times (e.g. *Evangelium medici*, 131). But it is not entirely clear that Le Grand too wants to go this far.

Having introduced his concept of primordial stamina, Le Grand goes on to cite John the Baptist, and writes that

We must believe that God can raise children unto Abraham from all things, and even from stones.

(*Dissertatio*, 121)³⁶

That is, we must believe that God can make even a stone take on the disposition for union with some given soul and thereby constitute it as this or that human body. Now Le Grand does not go on to elaborate, but his remark here also suggests that if he wanted, God could remove the disposition for union with a given soul from a human body and place it in an inorganic body instead. And in that case, it seems, the latter would be a continuation of the former, even though the same stamina would not be present in both. Le Grand does not tell us in so many words, but his view may have been that this is what happens in the Eucharist. The host takes on the disposition for union with the soul of Christ and thus becomes a continuation of the body of Jesus, even though materially the same stamina are not present in both.

But even if the presence of materially the same stamina may not be necessary for bodily identity over time, Le Grand did agree with Connor that it was sufficient, as well as possible. According to Le Grand, the organisms that ‘lie hidden’ in the ovaries of their female parents are built up out of ‘primordial stamina’ that form a kind of ‘vascular membrane’.³⁷ As this membrane expands as the result of nourishment, it grows into a viable foetus. After birth, the same system of stamina will continue to expand, and like Connor, Le Grand surmises that it will endure throughout the whole of the organism’s life. In his own words:

That this fibrous membrane that, I maintain, hides in the egg, and of which we say the foetus at first only consists, remains for the whole of its life, I too deem to be probable. And from this it is easy to see how a human body remains the same with regard to all of its primordial matter for the whole of its life.

(*Dissertatio*, 120–1)

Like Connor, Le Grand assumes that the core stamina that build up the human organism are somehow immune from material change. Given the flux of particles to which the body as a whole is subject, one may well wonder how this could be the case. But this is a question Le Grand never addresses. Instead, he

³⁶The biblical reference is to Matthew 3:9.

³⁷References to ‘primigenia Stamina’ and the ‘membranula fibrosa’ can be found in *Dissertatio*, 123, 121.

limits himself to stating that it is probable that some core entities within the human body resist the continuous flux of matter, and that these core stamina will even remain intact as the body as a whole decays.

Indeed Le Grand claims that as the body as a whole begins to decay, the vascular membrane out of which it was first built up endures, and will 'eternally last with regard to its inner and essential texture, which surely is not at all impossible' (*Dissertatio*, 121). According to Le Grand, this continued existence of the primordial stamina after bodily death in fact provides a key to the resurrection of the same body at the day of judgement. In his own words, with the theory of preformed stamina in place,

it becomes easy for us to understand in what way the same human body should rise again, also with regard to the same matter.

(*Dissertatio*, 121)

It is the presence of the same core of primordial stamina that makes the glorious bodies that rise again identical in the relevant way with the bodies that once died (*Dissertatio*, 121–2).

5. Conclusion

The Cartesian reduction of body to extension was challenged by Aristotelian thinkers on the ground that, without an ontology of matter and form, no body would survive even the slightest change in quantity. Le Grand took up this challenge, and developed an account of organic identity over time in the human body that draws on Descartes and contemporary ideas on animal generation in a number of interesting ways.

According to Le Grand, Aristotelian thinkers like Sergeant were correct to insist that what constitutes the identity over time of a human body has to be something intrinsic to that body. But unlike Sergeant, he denied that the relevant intrinsic factor here is an Aristotelian form. What identifies a human body over time, rather, is the particular disposition it has for union with a given soul, as well as the material core of preformed stamina that remains with it for the whole duration of its life. To develop this second idea, Le Grand made grateful use of contemporary accounts of animal generation. Thus with thinkers like Swammerdam, he held that the same organic structure is present in an animal from before conception up to maturity. But unlike Swammerdam, he connected this idea with the further claim that there is a material core that remains constant for the whole duration of an organism's life. This put him in agreement with Connor, even though he may not have agreed with Connor that material continuity was a necessary requirement for organic identity over time. Moreover, unlike Connor, Le Grand developed his account of preformed stamina in light of the finding that human females, too, contribute ova to generation. Indeed, the challenge

posed to him by his Aristotelian critic, led Le Grand to draw on a broadly Cartesian metaphysics of mind and body as well as on some of the best accounts of human reproductive anatomy available at the time to develop his account of organic identity over time in human animals.

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