Sensibility as Vital Force or as Property of Matter in Mid-Eighteenth-Century Debates

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Abstract Sensibility, whether understood in moral, physical, medical, or aesthetic terms, seems to be a paramount case of a *higher-level*, intentional property, not a *basic* property. Diderot famously claimed that *matter itself* senses, with sensibility being a general or universal property of matter, even if he sometimes stepped back from this claim and called it a 'supposition'. Crucially, sensibility here is a 'booster': it enables materialism to account for the phenomena of conscious, sentient life, contrary to what its opponents hold, for if matter can sense, and sensibility is not merely a mechanical process, then the loftiest cognitive plateaus belong to one and the same world as the rest of matter. Lelarge de Lignac noted this when he criticised Buffon for 'granting to the body [*la machine*, a then-common term for the body] a quality which is essential to minds, namely sensibility'. This view, which Diderot definitely held, was comparatively rare, stemming from medico-physiological sources including Robert Whytt, Albrecht von Haller, and Théophile de Bordeu. We then have, I suggest, an intellectual landscape in which newly articulated properties such as irritability and sensibility are presented either as experimental properties of muscle fibres to be understood mechanistically (Hallerian irritability), or as properties of matter itself (whether specifically *living* matter as in Bordeu and his fellow *montpelliérains* Ménuret and Fouquet, or matter in general, as in Diderot). I am not convinced that their debates involve an identical concept, but nevertheless propose a topography of the problem of sensibility as property of matter or as vital force in mid-eighteenth-century debates—not an exhaustive cartography of all possible theories, but an attempt to understand the 'triangulation' of three views: a vitalist view in which sensibility is fundamental, matching up with a conception of the organism as the sum of parts conceived as little *lives* (Bordeu et al.); a broadly mechanist view which builds upwards, step by step, from the basic property of irritability to the higher-level property of sensibility (Haller); and, more eclectic, a materialist view which seeks to combine the explanatory force of the Hallerian approach with the metaphysically explosive (mo-

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Acknowledgments Thanks to Alexandre Métraux for his critical remarks.

nistic) potential of the vitalist approach (Diderot). Examining Diderot in the context of this triangulated topography of sensibility as property should shed light on his famous proclamation regarding sensibility as a universal property of matter.

> Sensibilité, Sentiment (Médecine) : la faculté de sentir, le principe sensitif, ou le sentiment même des parties, la base et l'agent conservateur de la vie, l'animalité par excellence, le plus beau, le plus singulier phénomène de la nature, etc.[2]

Sensibility, in any of its myriad realms—moral, physical, aesthetic, medical, and so on—seems to be a paramount case of a *higher-level*, intentional property, not a *basic* property. That is, while we sometimes suspect, or at least pretend to suspect that rocks can sense, we do not consider sensibility an 'atomic' property like shape, size, and motion. Higher-level properties like sensibility, thought, memory, desire seem to belong to higher organisms, which leaves room for debate (lizards have recently, as of early 2012, been shown to display learning abilities which lead them to be classified higher up the cognitive scale—and of course the idea of a 'higher organism' is itself a piece of folk biology). Now, materialism is often considered to reduce all higher-level properties of our experience to basic ones such as, precisely, shape, size, and motion—which was of course the program of the mechanical philosophy in the seventeenth century. This leads to the once-frequent view that materialism is necessarily *mechanistic* materialism; as a recent entry in a noted secondary source, the *Oxford Companion to the History of Modern Science*, tells us, 'materialists explain everything in terms of matter and motion; vitalists, in terms of the soul or vital force'.[3] But anyone who reads a page of Diderot, to name one notable example, finds a very different constellation from this commonplace opposition between 'matter' and 'sensibility'.

Diderot famously made the bold and attributive move of postulating that *matter itself* senses, or that sensibility (perhaps better translated 'sensitivity' here, although for the sake of consistency, I will keep the older 'sensibility'[4]) is a general or universal property of matter, even if he at times took a step back from this claim and called it a 'supposition'. Crucially, sensibility is here playing the role of a 'booster': it enables materialism to provide a full and rich account of the phe-

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[2] Fouquet 1765, 38b.

[3] Wellman 2003.

[4] In this paper I use the English 'sensibility' for the French *sensibilité*, as it was the common term at the time, but it should be clear that I mean 'sensitivity': the property of organic beings to sense and respond to stimuli or impressions. Thus Haller's classic paper of 1752 (published in an English translation in 1755) is *A treatise on the sensible and irritable parts of animals*, not on their 'sensitive' parts. 'Sensibility' in this context is not, say, a term from moral philosophy but an organic term.

nomena of conscious, sentient life, contrary to what its opponents hold: for if matter can sense, and sensibility is not a merely mechanical process, then the loftiest cognitive plateaus are accessible to materialist analysis, or at least belong to one and the same world as the rest of matter.

This was noted by the astute anti-materialist critic, the Abbé Lelarge de Lignac, who, in his 1751 *Lettres à un Amériquain*, criticised Buffon, the great naturalist, author of the 15-volume *Histoire naturelle* (and its seven-volume *Supplément*), but also theorist of generation, for 'granting to the body [*la machine*, a common term for the body at the time] a quality which is essential to minds, namely sensibility'.[5] This view, here attributed to Buffon and definitely held by Diderot, was comparatively rare. If we look for the sources of this concept, the most notable ones are physiological and medical treatises by prominent figures such as the Edinburgh professor of medicine Robert Whytt (1714–1766), the Swiss, but Göttingen-based Albrecht von Haller (1709–1777), and the Montpellier physician Théophile de Bordeu (1722–1776), the latter being a key representative of the school we customarily refer to as the Montpellier vitalists. We then have, or so I shall try to sketch out, an intellectual landscape in which new—or newly articulated—properties such as irritability and sensibility are presented either as an experimental property of muscle fibres that can be understood mechanistically (Hallerian irritability, as studied recently by Hubert Steinke), or a property of matter itself (whether specifically *living* matter as in Bordeu and his fellow *montpelliérains* Ménuret and Fouquet, or matter in general, as in Diderot).

I am by no means convinced that it is one and the same 'sensibility' that is at issue in debates between these figures (as when Bordeu attacks Haller's distinction between irritability and sensibility and claims that 'his own' property of sensibility is both more correct and more fundamental in organic beings), but I am interested in mapping out a topography of the problem of sensibility as property of matter or as vital force in mid-eighteenth-century debates—not an exhaustive cartography of all possible positions or theories, but an attempt to understand the 'triangulation' of three views: a mechanist, or 'enhanced mechanist' view in which one can work upwards, step by step from the basic property of irritability to the higher-level property of sensibility (Haller); a vitalist view in which sensibility is fundamental, matching up with a conception of the organism as the sum of parts conceived as little *lives* (Bordeu et al.); and, more eclectic, a materialist view which seeks to combine the mechanistic, componential rigour and explanatory power of the Hallerian approach, with the monistic and metaphysically explosive

[5] To be precise, Lignac is following Condillac's criticism of Buffon, but he adds that Condillac is just as guilty of error since he 'attributes to the soul that which belongs solely to the machine'. Lelarge de Lignac, quoted by Condillac, *Lettre à l'auteur des Lettres à un Amériquain*, annexed to *Traité des animaux* (1755), in Condillac 1754/1984, 425.

potential of the vitalist approach (Diderot). It is my hope that examining Diderot in the context of this triangulated topography of sensibility as property sheds light on his famous proclamation regarding sensibility as a universal property of matter: 'sensibility is a universal property of matter'.[6]

1 Irritability/Sensibility as Commodity or Danger: A Hallerian Context

La sensibilité fait le caractère essentiel de l'animal[7]

The idea that certain types of organic matter possess reactive or even reflexive properties which were termed 'irritability' and 'sensibility' was, if not 'in the air' in a vague Zeitgeist-like sense, definitely discussed by a variety of figures across early modern Europe, in differing contexts (more or less experimentalist, more or less 'philosophical', more or less prestigious, and so on). While the history of these debates has largely been mapped out,[8] it is important for my purposes here to provide some reconstruction of this material—not least since it is so difficult to separate 'experimental' work or aspects from 'philosophical' statements or appropriations of something purportedly experimental.

The physician Francis Glisson (1598–1677), great authority on the liver, gall bladder, and rickets (in works such as his 1654 *Anatomia hepatis*), and Regius Professor of Physic at Cambridge, is the locus classicus for the property of irritability—a term which he coined (*irritabilitas*), as Albrecht von Haller noted. After writing a number of such medical treatises, he produced the *Tractatus de natura substantiae energetica, seu de vita naturae* (1672), a metaphysics of living nature in which a rudimentary level of perception was posited as existing in matter itself. Matter contains, he stated, the root of life. Just as particular organs have a capacity to react to certain stimuli, so ultimately did matter itself. Irritability was the equivalent at the functional level to the basic property of 'natural perception' in matter.[9]

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[6] Diderot, letter to Duclos, 10 October 1765, in Diderot 1955–1961, Vol. 5, 141. As I discuss below, he also calls it a 'general property of matter' and in other texts, casts doubt on this hypothesis.

[7] Haller 1777, 776a (the first sentence of the article).

[8] For the later debates on irritability and sensibility, see Duchesneau 1982; Duchesneau 1999; Vila 1998; Steinke 2005; for the earlier appearance of the concept of irritability, see Giglioni 2008.

[9] Guido Giglioni's various essays on Glisson are fascinating studies of this figure and broader issues in the history and philosophy of early modern life science. See, most recently, Giglioni 2008, 465–493.

Albrecht von Haller's concept of irritability, in contrast, has a distinctly experimental flavour—measuring the reaction of parts of the body that did not seem to transmit their stimulation to the 'soul' (which would be tantamount to reflexivity). This is the basic definition of how irritability differs from sensibility:

> I call that part of the human body irritable, which becomes shorter upon being touched; very irritable if it contracts upon a slight touch, and the contrary if by a violent touch it contracts but little. I call that a sensible part of the human body, which upon being touched transmits the impression of it to the soul.[10]

This force cannot come from the nerves, since even after they have been cut, muscular fibres can still be irritated, and contract.[11] Sensations are caused by impressions of objects on the nerves that transmit the impetus to the brain, and from there onto the soul.[12]

Irritability is a quantifiable, experimentally accessible property of the muscle fibres, to be studied mechanistically, in the sense that there will be a correlation between a measurable degree of irritation and a degree of irritation of the fibres: between structure and function. There is no metaphysics of living matter here, at least in appearance. For on the one hand, to be sure, Haller wants to define irritability in such a way as to rule out 'speculative hidden qualities'.[13] But on the other hand, when pushed as to the reason why certain types of organic matter possess such properties, Haller first attributes it to the 'gluten' within the fibre ('irritability is actually a force specific to animal gluten',[14] although he wavers on this), and then, coming dangerously close to just as vitalist a metaphysics as Glisson (or just as metaphysical a vitalism), attributes this 'vitality' to a hidden force, the *vis-insita*.[15] Sometimes he is more cautious, and either rejects such considerations as

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[10] Haller 1755/1936, 4–5.

[11] Haller 1755/1936, 39.

[12] Haller 1755/1936, 4.

[13] Steinke 2005, 106.

[14] Haller to Bonnet, 15 March 1755, in Sonntag, ed. 1983, 63.

[15] This intriguing expression does not appear in Haller's early lecture ('Dissertation') on sensibility and irritability, but, as Steinke has noted (Steinke 2005, 106, 123) only in the later *Elementa physiologiae* and revised editions of the *Primae lineae physiologiae*, e.g. 'The heart and intestines, also the organs of generation, are governed by a *vis insita*, and by stimuli. These powers do not arise from the will; nor are they lessened or excited, or suppressed, or changed by the same. No custom no art can make these organs subject to the will, which have their motions from a *vis insita*; nor can it be brought about, that they should obey the commands of the soul, like attendants on voluntary motion' (Haller 1779, Sect. 409, 198–199); the original Latin is in Haller 1747/1765, Chap. 9, Sect. 409, 184. The passage is misattributed in Elizabeth L. Haigh's otherwise excellent study to Haller's earlier Dissertation (Haigh 1984, 52). It is also used, without attribution, in the 'Anatomy' article of the *Encyclopaedia Londinensis,* Wilkes, ed. 1810, 563–564. (Thanks to Trevor Pearce, Lucian Petrescu, and Kimberly Garmoe for help with the correct attribution, as well as to Hubert Steinke for his assistance over time.)

overly philosophical (as when he wants to disqualify La Mettrie's radical appropriations of his work, turning irritability into a material basis for life), or plays the agnostic, declaring as regards the ultimate cause of irritability that the alleged source 'lies concealed beyond the reach of the knife and microscope'.[16] Haller the pupil of Boerhaave, the tireless vivisectionist, the inventor of ingenious Newtonian-inspired or otherwise 'geometric' methods and concepts for quantifying the hitherto mysterious properties of life, is himself something of a vital force thinker. Positioning him correctly on an *échiquier des possibles* of eighteenth-century debates combining, as they do, the metaphysics of the soul and the physiology of muscular motion, is easy in some respects, not least given his development of an experimental method and a 'protocol' by which different members of a laboratory can reproduce experiments, but it is difficult when it comes to metaphysical commitments.

For Haller does not want irritability to be presented as a material basis for life in the sense of *materialism* (as is explicit in his polemic with La Mettrie).[17] He wishes to preserve an independent 'arena' or space of existence for the soul, which is partly contingent on the distinction between irritability—belonging only to the muscles—and sensibility—which has to 'report' to the soul. This is also part of his disagreement with what I shall call below the 'sensibility monism' of vitalists such as Bordeu—a point further extended against Haller by Paul-Joseph Barthez (1734–1806) and other *montpelliérains*: there is an experimental disagreement, there is a disagreement about the place of philosophical considerations in medical practice,[18] but above all, Haller fears a scenario in which matter itself is alive, whether it is an 'irritable matter'—La Mettrie's—or a 'sensible matter'—Bordeu's, that of other vitalists overall, and Diderot's.

Conversely, Haller also disagrees with Robert Whytt, a professor of medicine at Edinburgh, for giving *too much* room to the soul. Whytt's 1751 work *An Essay on the Vital and Other Involuntary Motions of Animals* provided a general theory of sensibility, which he viewed as *primary* with respect to irritability. Whytt associated sensibility and life under the heading of one 'active sentient principle', which however he insisted could not be a mere property of matter itself.[19] Put differently, irritability presupposes sensibility, so that the latter is not the sole exclusive property of the nerves (which were taken to include, not just the conduit, but the 'nervous substance' itself). Rather, it is distributed throughout the body, whereas for Haller, as we saw, certain organs and tissue types are insensible. Re-

[16] Haller 1755/1936, 8.

[17] See Roe 1984, esp. 282–284.

[18] Boury 2008, 521–535.

[19] Whytt 1768, 128.

vealingly for our purposes, Haller more than once assimilated Whytt's view to Stahlian animism (the view that all active functions in the body are somehow the doings of the soul, which, despite being immaterial, is nevertheless controlling the body).[20] Rather than a monism of an active sentient principle, a variant (like Glisson's, but differently) of a vision of active matter, Haller promotes a structural model, that is, 'a decentralization of active powers within the animal economy'.[21] A key implication of this decentralised view is that irritability does not have 'anything in common with the soul', as Haller put it.[22] There is both a *functional* reason for this (the distinction between two types of properties but also two *levels*), and a *metaphysical* reason: both Whytt and La Mettrie pose metaphysical dangers, not so much 'animism or materialism' as they are usually presented, but really, materialism *simpliciter*, understood as a theory which explains the higher-level in terms of the lower-level.

If the problem is materialism, then it may even be artificial to separate the issue into *levels*—of matter, of functions, etc.—versus *metaphysics*: for the concern with levels is a metaphysical concern, with the lower and the higher. As Roger French comments nicely,

> Haller reserves the adjective 'sensible' for those organs or tissues which are capable of communicating to the soul within the brain and there arousing a conscious sensation. He therefore never accepted Whytt's notion of *unconscious* sensation, a mere lowly animal 'feeling' of the sort that allowed oysters to close up at the approach of danger'.[23]

I hope it is clear that, as in the other episodes of our story, what is at issue is an act of *attribution* of higher-level properties to a lower-level substrate; and more broadly, the articulation of a concept of living matter in which sensibility is the operative property. Haller himself—not Glisson, not Whytt, not Bordeu, and not Diderot—states that '[s]ensibility is the essential trait of the animal. That which senses is an animal, that which does not sense is not'[24] (the latter two thinkers do say such things, but my point is that here it is Haller himself speaking).

The story of irritability and sensibility, and their provenance and derivations in this period could be extended much further (with, e.g., Baglivi, Stahl, and Bonnet) but as I indicated at the outset, my aim is more limited in the sense that I want to

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[20] The debate (rather acrimonious as it was) continued for years: Whytt replied to Haller in his 'Observations on the Sensibility and Irritability of the Parts of Man and Other Animals: occasioned by Dr. Haller's late Treatise on these Subjects', in Whytt 1768; Haller's later *Mémoires* on sensibility and irritability are, amongst other things, are a further reply to Whytt. For further analysis see French 1969, 9, 63; Duchesneau 1982, Chap. 6; Steinke 2005, Chap. 3.

[21] Reill 2005, 131.

[22] Haller 1756–1760, Vol. 1, 91.

[23] French 1969, 71.

[24] Haller 1777, 776a (the first sentence of the article).

contrast three positions: higher-level properties as mechanistically specifiable properties of certain types of matter (Haller), as features of all living, organised animal matter[25]—organised as a system of interconnecting 'little lives' (the vitalist view), and lastly, as universal properties of matter itself (materialism, in its Diderotian variant). What is noteworthy so far is that even in the most mechanism-friendly part of the story, Haller's, the risk of slipping into a form of vitalism (for there are many forms of vitalism![26]) is constant, and perhaps made all the more explicit by the way in which figures like Glisson, and later Whytt or Stahl, need to be portrayed as defending purely idealistic, experimentally unsound or ungrounded metaphysics of life, as distinct from a more naturalistically grounded scientific study of organisms.

If Glisson's approach was an attribution of higher-level properties to a lower level he called 'living nature', which was negatively portrayed by Haller so as to guarantee his own experimental, scientific legitimacy, while presenting his predecessor as a mysterious-force vitalist,[27] the tension between Haller, Bordeu and the vitalists, and Diderot (who is in more of a 'dialectical' position with respect to the others) shows that a linear portrayal of the debate is a hopeless task, particularly a 'positivistic' account in which thinkers gradually move from metaphysical speculation to 'real science' via experimental trial and error. That is, as I shall indicate in closing, there is a permanent vitalist remainder in the attribution of a mind-like, reactive, and/or intentional property to a system of organised matter. Not only are the above-mentioned tensions not empirically resolvable (as if it were a matter of deciding between three theories of reflex action, or three disciplinary definitions of the role of physiology); their lack of resolution is also not just ideological (e.g. regarding commitments to a preserved space for the soul, given a naturalistic account of mental life), but metaphysical: the fear of attributing higher-level properties to a basic substrate, such as matter. Curiously, however, there is no neat separation between orthodox dualists and heterodox materialists here. Notably, because all parties, as I have noted, keep on slipping into various kinds of vitalism—never in the sense of mysterious vital forces like Hans Driesch's entelechies in the late nineteenth and early twentieth centuries, but rather in the sense of the insistence on the uniqueness of the functional properties of certain types of mate-

[25] For the case of plants see Garrett 2003, 63–81.

[26] Wolfe 2011b.

[27] Ironically, even Glisson needed to follow this procedure and distinguish his own metaphysics of appetite, perception, and living nature from the views of a *more* monistic, more vitalistic, and thus more radical thinker, the Renaissance naturalist Tommaso Campanella. For Glisson, Campanella 'assigned to inanimate material beings more than I would like to, that is, sensation itself' (Campanella, Tommaso. 1672. *De natura substantiae energetica*, 187, cited in Giglioni 2008, 479).

rial arrangements, namely, arrangements that form 'organised wholes', also known as *corps organisés*, or 'organisms' in our vocabulary, or 'animal economies' to use the period's term. Now, where this slippage into monism (since here the vitalist concept, or family of concepts, is one and the same as the monist concept[28]) frightens some thinkers, it is on the contrary a desirable outcome to others, not least since it allows for a naturalistically respectable way of dealing with complex properties: what I call sensibility as a 'booster' of matter.

2 Sensibility as Go-Between or Unifier: Vitalist Scenarios

> la doctrine de la sensibilité [est] la même avec celle du *vitalisme*[29]

When we speak of the Montpellier vitalists, we are referring to the group of physicians and professors of medicine (but also anatomy, botany, etc.) at the Faculty of Medicine at Montpellier, beginning in the mid-eighteenth century; the term 'vitalist' was applied to this group from approximately 1800, and indeed served as a self-description during those decades, although some, like Paul-Joseph Barthez, declared, after most of the influential works—by La Caze, Bordeu et al.—had already been published, that he did not 'wish to be the Leader of the Sect of the Vitalists'.[30] Given their shared insistence on sensibility as the sole, defining property of living beings, against Haller's basic distinction between irritability and sensibility, the vitalists could just as easily have been called 'sensibilists'; although in the end, Henri Fouquet, when reflecting retrospectively on their movement in an 1803 work, simply stated that the terms amount to the same thing, since whatever is sensitive (or sensible) is vital ('everything that senses, is vital'[31]).

With the vitalists, two major transformations occur with regard to the concept of sensibility as we have encountered it, primarily in its Hallerian presentation.

Empirically—or at a level presented as empirical, experimentally founded, observationally documented, and so on—sensibility is now presented as the primary and general property of living beings (tantamount to life, as Fouquet says above), so that the distinction between irritability and sensibility is jettisoned. To take two examples amongst many, Gabriel-François Venel (1723–1775), a chemist and

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[28] On sensibility as a monistic property in the 'philosophical medicine' of the *montpelliérains* see Vila 1998, Chap. 2.

[29] Fouquet 1803, 78, N. 5.

[30] Barthez 1806, Vol. 1, 98, N. 18. The first edition appeared in 1778.

[31] Fouquet 1803, 78.

physician who was close to Théophile de Bordeu, and authored the long, dense entry 'Chymie' in the *Encyclopédie*, stated in the two-line entry 'Irritabilité (Physiologie)', which is mainly a *renvoi* to Fouquet's long entry 'Sensibilité', that irritability was a word invented by Glisson, then revived 'nowadays by the famous Mr Haller', 'to refer to a particular mode of a more general faculty of the organic parts of animals, which we will discuss under the name "sensibility"'.[32] Irritability is just a mode of a more general and primary property, sensibility. Another, brilliant and under-studied, Montpellier vitalist figure was Jean-Joseph Ménuret de Chambaud (1733–1815), whom I shall not discuss in detail here.[33] In his fascinating article 'Œconomie Animale', Ménuret, too, refers to the property Glisson called irritability, in order to fold it into the more essential property of sensibility. The basic features of life, Ménuret argues, are 'movement and feeling (*sentiment*)' and these are 'probably reducible to one basic (*primitif*) kind', a yet more basic property, a 'singular property, the source of movement and feeling as connected to the *organic* nature of the elements composing the body'. Ménuret adds that this property depends on a unique type of union between molecules, which Francis Glisson discovered, and named *irritability*—but in fact, it is really just a mode of sensibility: '*such* a union of these molecules […] which in truth, is just a mode of sensibility'.[34] Forty years later, Fouquet, in his *Discours sur la clinique*, sounds the same theme—Haller 'falsely presented irritability as separate from sensibility, while it is essentially and necessarily related to the former'.[35]

Metaphysically, a major step is taken towards the assertion of a 'monistic' ground in which a certain type of matter, organised matter, is alive and senses. Bordeu repeatedly insists that sensibility is neither strictly mechanical nor a property of the soul: it is immanent in living fibres but decentralised and differentiated, since it takes on a form specific to the function of each organ. It is also, he insists

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[32] Venel 1765, 909b.

[33] For mysterious reasons Ménuret published mainly under the name Jean-Jacques, although his given name was Jean-Joseph, and his birth date is usually wrongly given as 1733. His Montpellier doctorate in medicine was on biological generation, arguing for epigenesis contra preexistence (*De Generatione Dissertatione Physiologica*, 1757). Closer inspection of the medical articles in the *Encyclopédie*, notably by Roselyne Rey in her 1987 thesis, published posthumously in 2000, indicated that Ménuret was a major contributor, whose articles display a high degree of intellectual coherence (Jacques Roger and Jacques Proust had called attention to Ménuret earlier). In Rey's view, if we set aside the case of the 'polygraph' Chevalier de Jaucourt, Ménuret's contribution to the medical articles in the *Encyclopédie*, from volume 8 onwards (excluding anatomy, surgery, and the *material medica*) is the largest, most homogeneous set of texts in that work (Rey 2000, 72). His articles span volumes 8–17, and were written between late 1758 and 1761, when he was aged 19 to 22. Ménuret spent most of his later career as an 'attending physician' at the Montélimar hospital.

[34] Ménuret 1765, 361.

[35] Fouquet 1803, 78–79, N. 5.

along with other *montpelliérains*, 'easier to understand than irritability', and 'can serve quite well as a basis for explaining all vital phenomena, whether in a state of health or of disease'.[36] As much as the vitalists often say that their type of inquiry is neither as reductive as that of the 'mechanists' (the target varies here, sometimes Boerhaave, sometimes the Italian iatromechanists, sometimes even Haller, despite how far removed he is from strict mechanism), nor as supernatural and unexperimental as that of the animists, Bordeu—in this rather different from Ménuret or Fouquet—is willing to tie his originality to Stahlian animism, specifically with regard to sensibility, which he names as the feature common to his, Stahl's, and Van Helmont's models: 'one cannot deny that those who treat each part of the body as an organ or a kind of being or animal with its own movements, action, department, tastes, and particular sensibility drew from the same sources as the Stahlians'.[37]

That sensibility is deliberately being construed as an anti-mechanist concept appears notably with Bordeu's choice of 'model organism', the glands, because their secretory and excretory capacity is precisely the type of function that the mechanist model could not do justice to; they respond to stimuli in ways that mechanism cannot specify, but which are also, of course, independent of soul or will. Bordeu's major work, the *Recherches anatomiques sur la position des glandes et sur leur action* (1752), is devoted to this topic. In this sense harking back to Glisson (who, as shown by Giglioni, was rather more of an active experimenter than Haller gave him credit for), Bordeu wants to stress that the glands have an innate activity and responsiveness to stimuli which can regulate the 'fluid dynamics' of the exchange between the inside and outside of a gland: this property is sensibility. Consistent with the idea that the glands are so many little *lives* (which, however, are independent of the soul), Bordeu also describes this responsiveness as dependent on a kind of *sensation*:

> Secretion can thus be reduced to a kind of sensation, if I may speak thus; the parts that can excite a given sensation will pass through, while the others are rejected; each gland, each orifice will have, so to speak, its personal taste; everything foreign will ordinarily be rejected.[38]

Through this property, fibres, tissues, organs, and organ systems carry out sequences of actions according to what Tobias Cheung has called stimulus-reaction schemes.[39] For Bordeu, this type of interconnective action is expressed through

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[36] Bordeu 1768/1818, 668.

[37] Bordeu 1768/1818, 671.

[38] Bordeu 1752/1818, Sect. 108, 163. Compare Diderot's, 'Why does each gland have its particular secretion? One cannot really answer otherwise than in terms of irritants, sensibility, animality, taste, the will of the organs'. (Diderot 1778/1975–, 387.)

[39] Cheung 2010, 66–104.

notions such as ‘sympathy’ and the ‘consensus of the parts’, which hark back to the older ‘conspiration’ (as in Claude Perrault’s statement that living bodies differ from ‘inanimate bodies’ because the former possess ‘sympathy and mutual conspiration’; he also speaks of ‘commerce’ and ‘mutual need’[40]). In this sense, sensibility is also a *network concept*, which easily shows how it can be picked up together with other concepts of the nervous system by a thinker like Diderot—but it is also a strictly *material* concept, without either any intervention of an entity such as the soul, or even of an ‘emergentist’ conception of hierarchical levels of organisation.

However, there is an ambivalence about the ontological status of sensibility (to borrow an expression from Tobias Cheung’s discussion of Bordeu).[41] That is, generally speaking, sensibility is a property of living matter for Bordeu. And his writing focuses on *medical* entities (rather than questions of basic structure or physiology[42]), stressing that the physician is an observer, rather than a quantitative natural philosopher (or experimental physiologist) seeking to discover, say, laws of nervous energy. The physician does not posit the soul, vital principles, or entelechies either. Nevertheless, questions remain. For one, Bordeu, Fouquet, and Barthez in particular speak philosophical language at times (as do Bichat and Bernard in the next generations), but especially, they conceive of sensibility in terms of the property of a substance. Whether or not vitalists are like Stahlians (they often say they are not, but as we saw, Bordeu sometimes equates his sensibility concept with Stahl and Van Helmont), they fall somewhere on this spectrum. Consider this somewhat inflated statement by Charles-Louis Dumas (1765–1813), the Dean of the Montpellier medical faculty in the early nineteenth century, who is defending the Montpellier school in a ‘wise’, retrospective analysis:

> The various tendencies in medicine stem from philosophers’ mistaken applications of the physical sciences or the metaphysical sciences, to the doctrine of living beings. Those who relied excessively on the physical sciences produced the ancient and widespread sect of the materialists. Those who relied on the metaphysical sciences produced the equally ancient sect of the spiritualists. In between these two, there exists a third class of physiologists who do not relate all the phenomena of life to matter or the soul, but to an intermediate principle which possesses properties (*faculties*) different from the one and the other, and which regulates, disposes and orders all acts of vitality, without being impelled by the physical impulses of the material body or the moral affections and intellectual foresight of the thinking principle.[43]

As a side note, it is interesting that Dumas uses such pure philosophical language to classify trends in medicine. (Claude Bernard also, as I noted, combines

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[40] Perrault 1680, 201.

[41] Cheung 2010, 94.

[42] Boury 2008, 528.

[43] Dumas 1806, Vol. 1, 296, quoted in Rey 2000, 386.

philosophical and physiological language, but when he classifies previous doctrines it is to show how far removed they are from experimental, laboratory science; no such *coupure* here.) But what does Dumas say? That materialists reduce everything to physics, animists (here termed spiritualists) are overly metaphysical, and finally the vitalists, who do things right, do not reduce vital phenomena either to matter or to the soul. What is this vitalist third way (which we need to grasp if we wish to grasp anything distinctive about Enlightenment vitalism)? If Dumas does not say: we vitalists operate heuristically and have understood that, unlike our predecessors, we should bracket off ontological considerations, Barthez does actually say exactly this, in the second edition of his *Nouveaux éléments*, in 1806, in a chapter with the revealing title 'Sceptical considerations on the nature of the vital principle', where he explains that he 'personifies' the vital principle only 'in order to refer to it more easily'; it really has no existence apart from that of the body. And above all, he adds, 'I am wholly indifferent to *Ontology* as the science of entities'.[44]

Bordeu had just such hesitations himself with regard to the ontological status of his 'principle', which he calls sensibility. If we recall that sensibility is often described as a 'self-preserving force' by these authors, that is, a type of reactivity or capacity for responsiveness that ensures our survival (e.g. Fouquet defines it as 'the basis and preservative agent of life'[45] and later, Diderot speaks of sensibility as a 'quality unique to the animal, which warns it of its relations to the surrounding environment'[46]), it is noteworthy that in a key passage of the *Recherches anatomiques*—actually a footnote to what is probably the most famous passage of the book, where he introduces the metaphor of the beeswarm to describe organismic unity—Bordeu asks if the 'ever-vigilant preservative force' that watches over 'all living parts', belongs to '*the essence of a part of matter, or a necessary attribute of its combinations?*'.[47] It is not possible to reconstruct Bordeu's thinking further and provide a definite answer to his question. But we can learn from this that the vitalist doctrine of sensibility poses itself the question, both of the ontological status of this property overall, and of the specific situation that obtains with regard to sensibility as (general) *property of matter* or (more restrictively) *of organisation*.

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[44] Barthez 1806, Vol. 1, 107, 99, Chap. 3, N. 17, 96 (it can be confusing that the notes added to this edition have their own pagination, also in Arabic numerals: thus the reader can read about the metaphysics of substance on page 96 of the main text and not find 'ontology', but if she turns to later sections where the page numbers restart, these sections appear).

[45] Fouquet 1765, 38b.

[46] Diderot 1778/1975–, 305.

[47] Interestingly—not least for commentators interested in the role of analogy in science—Bordeu here concedes that he must be content here with analogies, 'metaphorical expressions, comparisons'. Bordeu 1752/1818, Sect. 108, 163, Note. Emphasis added.

Vitalist sensibility—Bordeu's and others'—is not a merely mechanical-reaction property, because of its 'network' dimension, its way of explaining and at the same time implying the consensual, sympathetic interaction of the organic parts understood as *little lives*. I have mentioned this idea earlier, but only in passing; suffice it to say, here, that it is a core idea of Montpellier vitalism, consisting in the following: the organism (living body, animal economy) is not a set of inanimate parts but of organs understood as so many little *lives*. Ménuret speaks of 'the general life formed by the *particular lives* of the organs'[48]; Fouquet says that 'each organ senses or lives in its own way, and the concurrence (*concours*) or sum of these *particular lives* is life in general'.[49] The point was perhaps made best of all in an almost unknown text, a medical thesis on irritability defended at Montpellier in 1776 by a certain Mr 'D.G.' (who further research identifies as Jean Charles Marguerite Guillaume de Grimaud): this applies down to the level of the so-called molecules composing each organ, 'the life of each organ of the animate body is not a simple life, but the real product of as many *particular lives* as there are *living molecules* entering into the composition of the organ'.[50] This is neither mere aggregation of matter, nor mechanical relations between parts defined by shape, size, motion (and position).

However, like irritability, sensibility as discussed here is exclusively material and thus without any 'transcendent' or 'spiritual' dimension.[51] That is, as d'Holbach put it, whether sensibility is 'a quality that can be communicated, like motion, and is acquired through combination', or instead 'a quality inherent to all of matter', in both cases, it cannot belong to 'an unextended being, as the human soul is thought to be'.[52] Further, sensibility has both a reductionist dimension (in this not so far removed from Haller's irritability) and a holistic dimension: the former, because there is a specific analysis of types of tissue, of the structure and function of glands, and so on; the latter, because what is then stressed is the way in which organs interact and produce 'systemic' or 'organisational' properties. The more reductionist vision is apparent when Fouquet, when he underscores the compatibility of Haller's system and the system of sensibility (i.e. his own and Bordeu's), speaks both of the 'consensus of organs' *and* of 'their location' (i.e. spa-

[48] Ménuret 1765, 361b

[49] Fouquet 1765, 42b.

[50] Grimaud 1776, 12 (emphasis in original). I first encountered this text, quoted (only as 'D. G.'; I have added the attribution) in Huneman 2007, 262–276, 390–394 (notes), here, 390, N. 2.

[51] Boury 2008, 529.

[52] d'Holbach 1770/1998–2001, 229–230.

tial, positional information).[53] Or, to take an example from a different, but familiar author, La Mettrie in his 'materialist' rendition of the concept of irritability, also insists that each fibre of animal bodies moves according to an inherent principle, but with a less holistic result than, for instance, what Bordeu (or Diderot) will promote:

> each little fibre, or part of an organised body, is impelled by its own principle, the action of which is not dependent on the nerves, unlike voluntary motions; since these motions occur without the parts involved being in any interaction (*commerce*) with circulation.[54]

What is different in Fouquet's sense of the consensus/conspiration/sympathy of organic parts is that it is a *structural* view. For instance, he also speaks of the 'economic action of sensibility', with the term 'economic' being reminiscent of the technical term 'animal economy', that is, a system of interdependent relations over and beyond ordinary aggregation of matter, bringing together various 'lives' (active organs) in a manner he describes as 'harmony, symmetry and arrangement'. However, Fouquet—like Bordeu—remains agnostic about whether this harmony, this 'economic action' is the result of *interaction* or just of an additive accumulation of parts ('the concurrence or sum of these particular lives'[55]), closer to La Mettrie's vision.

It is hard to reduce vitalist sensibility to a straightforward claim or set of empirical points, whether we take our bearings for these from the history of medicine, of hybrid discourses 'of the nerves', passions, and spirits, or of course from philosophy. Yet at the same time, the Montpellier vitalists are consistent over time with a set of claims they make with respect to this property, even if they can be more or less Stahlian, more or less Hallerian-compatible, more or less materialism-friendly. There is a general *sensibility monism* here which makes it all the more natural that Diderot found it such an appealing concept—or an appealing medico-theoretical construct to turn into a concept, in order to challenge the Cartesian dualism laid out by the character d'Alembert in the first dialogue of the *Rêve de d'Alembert*.[56]

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[53] Fouquet 1765, 51a. It is important to remember that articles like these, which came out in the 1765 'batch' of the *Encyclopédie*, are thus fifteen years posterior to Bordeu's *Recherches anatomiques*.

[54] This is La Mettrie's comment in *L'Homme-Machine*, after listing ten experiments proving mind-body interaction. La Mettrie 1748, 74; 1960, 181–182.

[55] Fouquet 1765, 42b.

[56] I am not claiming there is some basic, unwavering relation between the 'practice' of physicians and the 'conceptualisation' of a philosopher—here, Diderot. Both because these physicians are very much *médecins-philosophes*, sometimes self-proclaimed, and their writings can bristle with philosophical references (especially Barthez who revised his *Nouveaux elements* with more and more empiricist references, pasting in Bacon and Hume in a desperate hope that his treatise would turn into a perfect piece of empiricism); and of course, because Diderot operates across

3 Sensibility as a Booster-Property of Matter in Diderot

> le vivant et l'animé, au lieu d'être un degré métaphysique des êtres est une propriété physique de la matière[57]

In the very first paragraph of Diderot's 1769 'dialogue' *Le Rêve de d'Alembert*, which was one of his two personal favourites amongst his works (the other being a mathematical essay on probabilities[58]), the character d'Alembert, who is a partisan of substance dualism, challenges the character Diderot—a materialist, as it happens—to account for the existence of consciousness and thought, and in doing so, introduces the problem of sensibility as a property. Referring to a discussion that seems to have taken place before the text begins, he declares to Diderot, 'this sensibility […] if it is a general and essential quality of matter, then stones must sense'.[59] That is, if the character Diderot thinks he can successfully defend thinking matter, or a variant of it, by reconfiguring it as *sensing* matter, the character d'Alembert responds: then you will also need to grant that stones can sense. Sensibility is hence present from the first lines of the text, and the word (*sensibilité*) is used a total of 37 times.

How can we define the steps taken from Haller, Bordeu et al. to Diderot? There are two equally trivial ways to proceed, which are roughly symmetrical, and focus respectively on two different works by Diderot, which indeed have a very different status. One is to view Diderot as a kind of proto-Bachelardian poet-metaphysician of the cosmos,[60] as manifest in the *Rêve* with its 'human polyps on Jupiter or Saturn!',[61] and thus present his contribution as a kind of leap into associative freedom beyond the constrained empirical studies of Haller and others. Sometimes this speculative dimension, in which Diderot's scientific imagination

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multiple registers—chiefly, for present purposes, an experimental-naturalistic novel or dialogue, *Le Rêve de d'Alembert*, and a naturalistic proto-work, the *Éléments de physiologie*—which stand in a fertile but ambiguous relation to each other. The well-known fact that Bordeu is also a character in the *Rêve* should illustrate the difficulty of traditional distinctions (without it having to imply that Diderot was the first postmodern, or practitioner of intertextuality).

[57] Diderot and Daubenton, 1751, 474a (quoting Buffon, *Histoire générale des animaux*, 'Comparaison des animaux et des végétaux').

[58] Diderot 1955–1961, Vol. 9, 126. Cf. 'Fragments dont on n'a pas pu retrouver la véritable place', in Diderot 1975–, Vol. 17, 223. The *Rêve* was unpublished during Diderot's lifetime (he gave one copy to Catherine the Great as a gift).

[59] Diderot 1769/1975–, 90.

[60] As in Alexander 1953 and (in a more sophisticated way) Saint-Amand 1984, where the cosmic dimensions of Diderot's speculations are now justified with quotations on complexity from Michel Serres.

[61] Diderot 1769/1975–, 125.

can reach conceptual 'places' that science cannot, is described as a kind of science-fiction, or more aptly, as 'a thought experiment on sensibility', in Anne Vila's terms, although she notes that it is a thought experiment which instantly has material effects and conversely, is itself 'materialised'.[62]

The other approach focuses on the *Éléments de physiologie* (an unfinished text on which Diderot worked in the late 1770s), and views Diderot as a commentator on scientific studies of sensibility, who remains at the level of fragments, unable to provide his own scientific theory. Namely, if Haller's physiology contributed the idea of a combinatorial system composed of the structural elements of the organism, which amounted to a system of functional vital properties corresponding to various levels of organic integration,[63] Diderot is, on this view, either a mere commentator on such concepts, or a naturalistically inclined philosopher seeking to accumulate information to support his general vital-materialist views.

A more sympathetic or expansive version of this view, which grants Diderot more originality, is to view his reflections on irritability and sensibility, fibres and organs, bodies and networks as a genuine expansion of vitalist organicism, in the direction of a total 'science of man', understood as an integrated doctrine of the physical and the moral. And it has been observed by commentators at least as far back as Yvon Belaval that the *Éléments*, which Diderot probably intended to publish if he had been able to continue, closely resembles contemporary treatises on 'L'Homme' such as those by Marat or Le Camus.[64] Indeed, there is a careful articulation of Haller, Bordeu, and Barthez in the *Éléments* (along with Whytt and additional figures I shall not discuss); the title itself is, of course, the same as that of the French translation of Haller's 1747 *Primae lineae physiologiae*: *Elémens de physiologie* (first translation by Tarin, 1752, second translation by Bordenave, 1769).

Diderot brings together a mechanistically oriented account of a structural relation between solid parts (from Haller), the more holistic sense of an integrated network of sensibility/sympathy (from Bordeu and Barthez), and various other theories of organic matter concerning what we might call 'vital *minima*', that is, the minimal constituents of organic life which are themselves 'alive' and possessed of animate properties.[65] And he collapses any residual dualist distinction between irritability and sensibility (which after all, in Haller and in Whytt, although in completely different ways, had served to preserve a concept of soul): 'In

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[62] Vila 1998, 74. For my discussion of this issue see Wolfe 2007, 317–328.

[63] Duchesneau 1999, 197. In the later portions of his article Duchesneau seems to defend Diderot's originality as a contributor to medico-physiological theory.

[64] Belaval 2003, 257.

[65] Wolfe 2010, 38–65.

general, in the animal and in each of its parts—life, sensibility, irritation'.[66] Differently from Whytt or Bordeu and his colleagues who had to insist on a quasi-metaphysical primacy of sensibility, Diderot just renders them identical:

> This force of irritability is different from any other known force; it is life, sensibility; specific to the soft fibre; weaker, then extinct in the tightened fibre; greater in the fibre attached to the body than to the fibre separated from it. This force is not dependent on gravity, attraction or elasticity.[67]

The life of the 'whole animal', is the composite of the life of each organic component, interacting in a relation of 'sympathy', which sometimes is not dependent on any centre, any 'controller' at all: 'there are sensing and living organs, coupling, sympathising and concurring towards the same goal, without the participation of the whole animal'.[68] This raises the question of the *unity* of the organism (in the *Rêve*, the unity of the self, which Mlle de Lespinasse worries about—to which the character Bordeu replies precisely with a doctrine of *organismic* unity, that is, you are yourself because of the individuality of your body or *organisation*). After all, if an organism is a sum of many lives, whether this is an additive sum or one that involves qualitative shifts, where is the limit? This is another one of the difficult questions which neither Diderot nor Bordeu—both of whom pose it—resolve to anyone's satisfaction, including their own. One recalls that Bordeu introduced the image of the beeswarm as a *metaphor* of organic unity, and Diderot, although he expands on it and adds other metaphors including the spiderweb and the harpsichord (for the vibrating 'strings' of the nervous system), does not present it as anything other than that. Now, my purpose here is not to reconstruct a possible 'materialist theory of the self', in Diderot and others,[69] but rather to enquire into the extent to which a concept like sensibility functions as a 'booster' for the materialist—a *functional booster*, at the level of physiology and medicine, and an *ontological booster*, with respect to levels of organisation, emergence, and reduction.

Yet we must not lose sight of the fact that this appropriation of the concept of sensibility is a key part of Diderot's attempt to articulate organic unity, as something different from the unity of machines, or that of the universe as a whole. And, crucially for the specifically *biomedical* context I have sketched, this attempt is not generically metaphysical or inspired by classic texts in the history of philosophy, but is particularly close to medical texts such as Bordeu's; as Henry Martyn Lloyd suggests in Chap. 8, 'for the discourse of sensibility, the master discourse

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[66] Diderot 1778/1975–, 449.

[67] Diderot 1778/1975–, 308.

[68] Diderot 1778/1975–, 501.

[69] I attempt an initial presentation of the problem in Wolfe 2011a.

was medicine'. Even if the idea of matter as possessing animate features can be viewed as something Leibnizian (as a 'materialisation of the monad', as it is sometimes described, or a kind of panpsychism, which La Mettrie had already recognised as a danger: 'the Leibnizians, with their *Monads*, put forth an unintelligible hypothesis. They have spiritualised matter rather than materializing the soul'[70]), or as harking back to Renaissance matter theory as in Campanella,[71] it has a very particularly medical, *embodied* flavour here. Consider Diderot's approach to the unity of animals or organisms he calls 'continuity' as opposed to the merely spatial 'contiguity' that exists between heaps of matter: 'Without sensibility and the law of continuity in animal substance (*contexture*), without these two qualities, the animal cannot be one'.[72] Biology and medicine or metaphysics were hard to separate with respect to sensibility as late as the mid-nineteenth century, as noted by Littré: 'sensibility or the function of the nerves […] is a final terrain in which theology and metaphysics still compete with biology'.[73]

That sensibility is a medical concept with an expansive conceptual potential can also be seen in another way: Diderot (and partly La Mettrie before him, for whom 'irritability' is the general monistic term rather than 'sensibility') sees that a concept such as sensibility allows him to integrate conceptually the reactivity and representational capacity of mind (the nervous system, the brain as a 'book which reads itself', as Diderot puts it[74]) *while maintaining a thoroughgoing naturalism*—there are no properties which are not properties of natural beings subject to causal processes as specified in the natural sciences (whatever these may be: thus the naturalism of a Hobbes or a d'Holbach, who seem to be intuitively *physicalists*, is very much a reduction to the physical properties of matter, while the naturalism of a Gassendi, a Diderot, or, a few decades later, an Erasmus Darwin is a reduction to

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[70] La Mettrie 1748, 2; 1960, 149.

[71] Diderot provides some indication as to the Leibnizian provenance of his idea of sensibility as a universal property of matter in his *Encyclopédie* entry 'Leibnitzianisme', where he associates Aristotelian entelechies, monads, and 'sensibility [as] a general property of matter' (Diderot 1765b, 371a). As in other cases, his source is Johann Jakob Brucker's 1744 *Historia critica philosophiæ*. Belaval notes that the publication of Jean-Baptiste Robinet's Leibnizian *Philosophie de la nature* in 1765—the year of the letter to Duclos—may have led Diderot to the idea of consideration of animate parcels of matter (Belaval 2003, 334, N. 3). For more on the Leibnizian background of sensibility, see Nakagawa 1999, 199–217. Jean Varloot sees the notion of a universal sensibility in matter as going back all the way to Campanella! (in Diderot 1962, Vol. 3, ci, N. 3).

[72] Diderot 1778/1975–, 307.

[73] Littré 1846, 229.

[74] 'The soft substance of the brain [is] a mass of sensitive and living wax, which can take on all sorts of shapes, losing none of those it received, and ceaselessly receiving new ones which it retains. There is the book. But where is the reader? The reader is the book itself. For it is a sensing, living, speaking book, which communicates by means of sounds and gestures the order of its sensations'. (Diderot 1778/1975–, 470.)

matter conceived as the bearer of vital, animate properties, typically attributed to minimal components of matter named 'semences', 'seminarerum', or 'molecules'[75]). This naturalism has been interpreted in various ways by Diderot commentators in recent decades: as 'monism', or 'holism', or again 'emergentism'. These contemporary terminological decisions do not modify the fundamental intuition that (i) matter is 'one', a unified whole (both at the level accessible to our measuring instruments and at a metaphysical level: Nature makes no leaps), (ii) properties such as sensibility, consciousness, memory, desire, instinct are 'just there'—no room for external world scepticism, 'no pleasure that is felt is chimerical'[76]—and as such belong to the material whole as stated in (i).

Diderot is less willing to commit to a definitive position regarding (iii) whether these properties are *universal properties of matter*, as he often says (we might also say 'basic properties', thinking of Ménuret's insistence that movement and sensibility reduce to 'one primitive notion'[77]), or properties only of *organised wholes*: 'Sensibility, a general property of matter or a product of organisation'.[78] The first view certainly fulfils the requirements of a materialist metaphysics, and is pleasingly immanentist, except that it is also a potentially 'panpsychist' view in which tiny parcels of matter are themselves said to think, feel, remember, and react (recall La Mettrie's warning about 'spiritualising matter'); the second view offers the advantage of a hierarchical arrangement in which there are levels of organisation—today we might say 'levels of complexity'—which are interrelated within a general material whole.

Here we leave specifically Bordevian or vitalist territory in Diderot and return to metaphysics. In the earlier *Pensées sur l'interprétation de la nature* (1753), Diderot had reflected on the quasi-aporia of the relation between living matter and dead matter, and put forth a series of 'queries' (somewhat reminiscent of the Queries which followed Newton's *Opticks*) which tended to challenge the distinction between these two states. Whether we view this as an empirical or a metaphysical issue in Diderot, he definitely insists that the distinction is false inasmuch as what is alive is constantly in a process of fermentation and corruption, and what is dead is conversely in a process of being *assimilated* into life, like the marble of the statue, ground into earth, growing into plants, and eaten by animals, and so on—a process for which he or d'Holbach coined a term, 'animalisation'. As Diderot says in his marginal commentary on Franz Hemsterhuis's *Lettre sur l'homme* (1773–1774):

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[75] On vital *minima* in a materialist context see Wolfe 2010.

[76] Diderot, Letter III to Falconet, in *Le pour et le contre* (correspondance avec Falconet), in Diderot 1975–, Vol. 15, 9.

[77] Ménuret 1765, 361b.

[78] Diderot 1769/1975–, 105.

> When I was born, I could only sense along a length of about eighteen inches at the most. How was I able, with time, to feel along a length of five feet and some inches? I ate. I digested. I animalised. By a process of assimilation, I turned *corps bruts* from inert to active sensibility.[79]

So animalisation is a process which ensures that matter is sensible, since it is constantly moving from inert to active; and the new distinction between *inert* sensibility and *active* sensibility can help resolve some of the above difficulties.[80] But isn't this just another version of dead matter versus living matter? Or (to point to a different problem), monism seems to indicate that Diderot should opt for *one kind of matter*, not two, and then claim that this matter senses. But—as he notices in his critique of Maupertuis' panpsychism—it seems to be a mistake (although of what sort is not clear: empirical? metaphysical?) to endow the element—the 'molecule'—with the properties of the whole—*l'organisation*, or here, to endow matter with the properties of organised wholes.[81]

Again, what is the status of sensibility? Diderot's dilemma, or at least his ontological decision, returns here: 'Sensibility, a general property of matter or a product of organisation'.[82] He addresses this in a variety of texts—'speculative' ones such as the *Rêve*, 'experimental' ones such as the *Éléments* (however much the distinction between speculative and experimental may be shopworn and of limited use here), letters to Sophie Volland (October 1759) and better-known, to Duclos (October 1765), commentaries and critiques on other thinkers such as Hemsterhuis and Helvétius. Before trying to achieve some resolution on the issue by way of conclusion, let me try and map out the situation in Diderot.

First, there is no clear-cut distinction between different texts which represent different positions on the issue, as some have suggested. Granted, the *Rêve* is more speculative than the *Éléments*, but even in the latter, he asks, 'Why not consider sensibility, life and motion as so many properties of matter, since these qualities are to be found in every portion, every particle of flesh?'[83] Yet, second, it is clear that different viewpoints are adopted, not some kind of perpetual polyphony. Thus in the *Réfutation d'Helvétius*, four years after the *Rêve*, Diderot calls the general sensibility of matter a mere 'supposition', which is not sufficient for 'good philosophy', and admits that 'the necessary connexion in this shift, escapes me'.[84] That is, how can inert matter become active matter? This is why epigenetic processes such as embryo growth in the egg are so metaphysically 'pregnant', so to speak,

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[79] Diderot, *Observations sur Hemsterhuis*, in Diderot 1975–, Vol. 24, 304.

[80] See the brief but useful discussion in Duflo 2006, 347–352.

[81] Wolfe 2010, 57, 65.

[82] Diderot 1769/1975–, 105.

[83] Diderot 1778/1975–, 333.

[84] Diderot 1875/1994, 297–298.

for Diderot: because they provide evidence that out of exclusively material layers something like life (a.k.a. sensibility) emerges. Hence sciences such as the nascent biology of the eighteenth century but also chemistry and medicine are of great importance, if not in filling out the blanks in this 'passage' so that all necessary causal links are made explicit, at least in articulating it as a material process.

If Diderot's 1759 and 1765 letters treat us to some real phantasmagorias, with the idea of matter possessing sensation for all eternity[85] so that the molecules of lovers buried side by side will join together after the deaths of their individual organisms, and less romantically, the description of the animal as a 'laboratory' in which sensibility shifts from inert to active,[86] in the last texts, including the *Eléments*, the problem of whether sensibility is a universal property of matter indeed becomes strictly experimental, with considerations of flayed vipers, the trunks of eels, and sectioned grass snakes:

> I am inclined to believe that sensibility is nothing other than the motion of animal substance, its corollary; for if I introduce torpor, i.e., the end of movement at a given point, sensibility also ceases. […]
> The sensibility of matter is the specific life of the organs. The proof of this is obvious in the viper that has been skinned and beheaded; in the section of the eel and other fish, in the grass snake divided into parts, in the various separate, palpitating parts of the body, in the contraction of the heart when it is pricked.[87]

And he explicitly uses the language of 'demonstration': 'Someday it will be demonstrated that sensibility or touch is a sense common to all beings. Some phenomena already indicate this'.[88] Sensibility as the life 'proper to organs', as a sense which is 'common to all beings': we are back at a vitalist vision of sensibility as the life of a system of organs.

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[85] 'Feeling and life are eternal. What lives has always lived and always will. The only difference I know between death and life is that at present, you live as one mass, and that once dissolved, scattered into molecules, twenty years from now you will live in detail.' (Diderot, letter to Sophie Volland, 17 October 1759, in Diderot 1955–1961, Vol. 2, 283–284.)

[86] Diderot, letter to Duclos, 10 October 1765, in Diderot 1955–1961, Vol. 5, 141.

[87] Diderot 1778/1975–, 305–306. Jacques Chouillet suggests that Diderot wrote the *Principes philosophiques sur la matière et le mouvement* (1770) to resolve empirically this problem of the 'passage' from the inert to the active, even though there is no discussion of sensibility or life in the text; but there is another, even more fundamental act of 'monistic collapse', of the difference between inertia and motion (Chouillet 1984, 54).

[88] Diderot 1778/1975–, 308.

4 Conclusion

Diderot adopts a vitalist solution to the series of metaphysical aporias concerning sensibility and matter. He did not opt for the straightforward solution that sensibility results from organisation, instead stating, even when discussing particulars such as grass snakes (much as La Mettrie had combined the metaphysics of irritability with the case of lizards in one passage), that sensibility is a property of matter. As Timo Kaitaro has put it, if sensibility results from organisation, one then has the problem of explaining this organisation, whereas if matter possesses some vital properties, an elementary form of sensibility, this could be used in explaining its tendency to form organised wholes.[89] And, as we saw with respect to Fouquet, Bordeu, and La Mettrie's versions of the organism as composed of little lives, there are also different degrees in their articulations of organisational 'wholeness'. The aporias of living and dead matter, inert and active sensibility, and generally, sensibility as ontologically irreducible or as a result of certain types of organisation, may or may not be fully resolved, even if it is hopefully clear that the subtle vitalist reflections did not just arrive at Diderot's 'science-fiction' or phantasmagorias as a terminus. But we have seen that the property of sensibility acts as a conceptual booster—the materialist's privileged route of access to 'what lies higher', as seen with the dialogue between Diderot and d'Alembert—and one which is of specifically medical origin.

In the end, for Diderot, rocks do not sense except in the rather 'God's-eye', Spinozist sense that in the long run, they too will be 'animalised'. Organisms sense; sensibility is the definitory property of organic matter. Thought cannot result from the mere spatial proximity of molecules, the contiguity of matter; it 'results from sensibility', which is inert in *corps bruts* like rocks, and active in living bodies, by being assimilated with 'living animal substance'.[90] In addition to the rather technical considerations we have encountered concerning how organisms hang together, it is important to remember that if d'Alembert grants Diderot's claim that matter can sense—that sensibility is a universal or general property of matter—he will have granted everything, for Diderot, in this extending an empiricist insight which nowhere appears as radically as in his version, has collapsed all cognitive functions into modes of sensation: 'The only thing that is *innate* is the faculty of sensing and thinking; all the rest is acquired', or as d'Holbach has it in the *Système de la nature* (a work on which Diderot was an active collaborator), 'What is it to think, enjoy or suffer, if not to sense?'[91]

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[89] Kaitaro 2001, 113.

[90] Diderot, letter to Duclos, 10 October 1765, in Diderot 1955–1961, Vol. 5, 141.

[91] Diderot 1765a, 754a; d'Holbach 1770/1998–2001, 322.

I have not tried, as is often done, to reconstruct a problem and its solutions, such as, 'how did these thinkers move from a mechanistic model to one recognising the complexity of sensibility as a feature, either of the self-regulation of organisms and/or of the nervous system?' Rather, I have suggested a topography of the problem of sensibility as property of matter or as vital force in the mid-eighteenth century, in the tangle of disciplines and discourses devoted to the nature of living, biological entities—not an exhaustive cartography of all possible positions or theories, but an attempt to understand the 'triangulation' of three views: a mechanist, or 'enhanced mechanist', view in which one can work upwards, step by step from the basic property of irritability to the higher-level property of sensibility (Haller); a vitalist view, in which sensibility is fundamental, matching up with a conception of the organism as the sum of parts conceived as little *lives* (Bordeu et al.); and, more eclectic, a materialist view which seeks to combine the mechanistic, componential rigour and explanatory power of the Hallerian approach, with the monistic and metaphysically explosive potential of the vitalist approach (Diderot). As we have seen, the relation between the medical-vitalist approach to sensibility and Diderot's appropriation and transformation of that approach, is not one that lets itself be labelled easily, although his conceptual innovation in developing what Anne Vila calls the 'superproperty' of irritability and sensibility taken as a whole,[92] is undeniable. In the 'laboratory' of the animal which forms the metaphysical horizon of the embodied materialist, 'to sense is to live'.[93]

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[92] Vila 1998, 15.

[93] Diderot 1778/1975–, 447.

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