

MEDICINE AND MATERIALISM

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This article deals with the relations between literature and medicine from the point of view of the ill-defined field of intellectual history, which can be very roughly defined as the study of historically situated discourse, by attempting to understand its conditions of production, its presuppositions and implications, in relation to the author's purpose. This type of study fits uneasily with disciplinary history and, to the extent that it often transcends disciplinary boundaries as they are at present defined, it can upset comfortable habits and ways of studying problems. The present article does not come within the normally understood limits of the history of medicine, and in it literature is understood in a very broad sense, but it attempts to raise some questions about the use of medicine in wider discourse and to show how a close reading of texts can help to understand this use and bring out its implications.

I shall be concerned here with what is generally called 18th-century materialism, by which I mean the attempt to elaborate a material explanation of humans without calling on an immaterial and immortal soul. These attempts do not necessarily imply atheism, even if they inevitably go against the official doctrines of the christian churches. They include much theological discussion, and have generally been studied in the context of free thought and criticism of religion; scholars have been largely concerned to study the influence of philosophers such as Descartes, Hobbes, Spinoza or Locke, as well as of the older traditions of Antiquity. However, as materialistic arguments were concerned with the definition of matter and attempts to demonstrate that matter was not simply passive but could possess its own innate activity and sensitivity and even think, from the later 17th Century many materialistic works call on medical arguments to explain how the brain could produce thought, to describe the functioning of the animal spirits or to quote experiments demonstrating the irritability of the body's fibres; comparative anatomy is also used as are observations on reproduction (Thomson 2001a). The purpose of these works is obviously not directly to provide medical information, and the authors often seize on any evidence or argument that can be used to illustrate their point of view or shore up their demonstration.

They are not always too concerned about coherence in their use of arguments or theories, although it is difficult to generalise, in view of the variety of works and authors. These materialistic works include a certain number of often anonymous books, like *L'Ame matérielle* or *Essais sur la recherche de la vérité*, circulating mostly in manuscript form, which merely evoke medical arguments. Several of them quote a passage from a medical work, *Discours anatomiques* (1675) written by the Epicurean Paris doctor Guillaume Lamy, which proposes a material fiery soul of the world in the Stoic tradition.

Early 18th-century materialist works also, however, include a certain number written by medical doctors, which draw on medical examples: Dr William Coward's books published in England in 1702-6 (two of which were condemned by Parliament to be burnt by the common hangman); Dr Abraham Gaultier's strange *Réponse*, published in Niort in 1714, a version of which circulated clandestinely under the title of *Parité de la vie et de la mort* (Gaultier 1996); or Julien Offray de La Mettrie's deliberately provocative books published from 1745 to 1750 which led to his exile from France first and then the Netherlands (Thomson 2000). The main purpose of most of these works is religious, and political to the extent that religion is a pillar of the political order, medicine serving mainly as a weapon in the struggle; nevertheless the medical dimension is vital, as can be seen from the fact that Denis Diderot, the author of the most interesting and subtle materialistic reflexion in the 18th Century, could only do so after having spent a certain time studying medical works.

Before going on to look at his thought in more detail, a further introductory remark needs to be made in connection with Diderot's medical inspiration, which came largely from the Montpellier school, usually described as «vitalist» (Rey 2000). In *Le Rêve de d'Alembert*, the work which explores in greatest detail a materialistic conception of humans, Diderot uses as his mouthpiece the Montpellieran Dr Théophile de Bordeu. This has often led to Diderot's «vitalistic materialism» being opposed to La Mettrie's «mechanistic materialism», as La Mettrie proclaimed himself a pupil of the famous Dutch teacher Dr Hermann Boerhaave, considered to be the leading representative of the iatromechanist school which the Montpellierans rejected. La Mettrie translated several of Boerhaave's works into French. This simplistic opposition is however, I contend, a rather deformed view of things, as I have discussed elsewhere (Thomson 2001b). Apart from the fact that medical historians have warned against labels (King 1978), it should be pointed out that those who used medicine to back up a materialistic view of humans were not in general too concerned with doctrine and were generally willing to use whatever suited them. This should incite us also to look more closely at

what exactly they were doing, which may also encourage us to adopt a less rigid view of medical history. In what follows we shall study in more detail two interconnected examples of how a detailed study of texts in relation to the author's aims and the circumstances of their production can help us to grasp more clearly the implications and the issues at stake and avoid generalisations.

La Mettrie and «l'oscillation des corps organisés»

Stahl au reste n'est pas le seul qui ait rejeté le principe d'oscillation des corps organisés. De plus grands esprits ne l'ont pas employé, lorsqu'ils ont voulu expliquer l'action du cœur, l'érection du pénis etc. Il n'y a qu'à lire les Institutions de Médecine de Boerhaave, pour voir quels laborieux et séduisants systèmes, faute d'admettre une force aussi frappante dans le cœur, ce grand homme a été obligé d'enfanter à la sueur de son puissant génie.

Willis et Perrault, esprits d'une plus faible trempe, mais observateurs assidus de la Nature (que le fameux professeur de Leide n'a guères connue que par autrui, et n'a eue, presque que de la seconde main) paraissent avoir mieux aimé supposer une âme généralement répandue par tout le corps, que le principe dont nous parlons. Mais dans cette hypothèse, qui fut celle de Virgile, et de tous les Epicuriens, hypothèse que l'histoire du polype semblerait favoriser à la première vue, les mouvements qui survivent au sujet dans lequel ils sont inhérents, viennent d'un *reste d'âme*, que conservent encore les parties qui se contractent, sans être désormais irritées par les sens et les esprits. D'où l'on voit que ces écrivains, dont les ouvrages solides éclipsent aisément toutes les fables philosophiques, ne se sont trompés que sur le modèle de ceux qui ont donné à la matière la faculté de penser, je veux dire, pour s'être mal exprimés, en termes obscurs, et qui ne signifient rien. En effet, qu'est-ce que ce *reste d'âme*, si ce n'est la force motrice des Leibnitiens, mal rendue par une telle expression, et que cependant Perrault sur-tout a véritablement entrevue. V. son *Traité de la mécanique des Animaux*. (La Mettrie 1960, 188)

This short passage from Julien Offray de La Mettrie's *L'Homme machine* (1747), a provocative work which openly defended an irreligious materialistic view of humans, illustrates how medicine was used in the 18th Century to support such arguments. It also emphasizes the difficulty of labelling this materialism. Before looking at it in more detail, however, some explanation is needed concerning early 18th-century arguments against an immaterial soul. As I have indicated, we frequently find, particularly in the clandestine anonymous works, the Epicurean or Stoic

model of a material soul or sometimes world spirit, a sort of igneous very fine spirit spread throughout the body which is responsible for thought. This model tends to be replaced as the century goes on by an alternative and richer conception of thought as a property which emerges from a particular organisation of active matter. In his first philosophical work, *L'Histoire naturelle de l'âme* (1745) La Mettrie seems to hesitate briefly between the two, and reproduces the passage concerning the fiery soul from Lamy's *Discours anatomiques* (La Mettrie 1988). The purpose of this work is to demonstrate that all our ideas come from the senses and that the organ in the brain which receives these sensations, the *sensorium commune*, is material. As all our sensations are brought to it by the nerves, we do not perceive the objects as they really are but rather the changes that they make in the nerves and the movement they transmit to the *sensorium* in the brain. Although he ostensibly retains the Aristotelian model of three souls, and therefore an immaterial intellectual soul, all of La Mettrie's analysis implies that all the intellectual faculties depend on this material organ in the brain. He admits his ignorance, however, as to how matter can become sensitive and think.

The passage by Lamy is quoted not completely accurately after a reference to François Quesnay's *Traité du feu* and to the role played by the ether in the formation of bodies. La Mettrie introduces the passage by linking it to the theory, derived from Campanella, of the world soul originating in the sun and to the theory of reproduction expounded in Boerhaave's chemical writing. He may also be referring to the latter's theory of fire, derived from Newtonian ether theory and further developed by Quesnay. Finally, however, like the later materialists, gives up this conception of a material soul, and in *L'Homme machine* (1747) he denies the existence of any substance called the soul, as Diderot did much later in *Le Rêve de d'Alembert*. Thought is produced by a particular organisation of active matter in the brain or a part of the brain.

Hence, in *L'Homme machine* he tries to demonstrate that matter, or at least the smallest parts of organised bodies, possesses motive force and inherent activity. He quotes various famous experiments carried out by different physiologists to demonstrate the existence of irritability in parts of the body separated from the whole. In his contemporaneous adapted translation of Albrecht von Haller's annotated edition of Boerhaave's *Institutions*, he refers in this connection to Francis Glisson, who in the middle of the preceding century developed the notion of irritability which, unlike Haller, he attributed to all types of fibres (Boerhaave 1747, 209). La Mettrie may well have been influenced by Glisson's theory, which exercised a certain influence in the 18th Century, particularly on the Montpellier school. In the passage quoted above, however, it is not

Glisson's name that is cited, but those of others. Criticism of Stahl recurs throughout La Mettrie's works, which is why it is surprising to find Claude Perrault referred to approvingly, as Perrault's animism is often likened to Stahl's. Perrault's discussion of the «ressort» of fibres probably owes something to Glisson's theory, but he defends dualism and attributes the life of the body to the immaterial soul, which is in contact with all parts of the body by means of the animal spirits. He thus blurs the dividing line between the two substances and seems to give matter a type of inherent activity. He distinguishes «distincte» from «négligée et confuse» thought, and external reason which is clear and distinct from animals' internal reason governing the vital functions, which is confused, obscure and habitual (Perrault 1721, 273, 282, 519). His theory is different from that of the person whose name La Mettrie couples with his, Thomas Willis, well known for his studies and dissections of animal brain, whose work was often used by those who attempted to provide a materialist explanation of thought. He was also influenced by Glisson, but was mainly a disciple of Gassendi, whose theory of a material vital soul he adopted (Isler, 1968). La Mettrie chooses here to interpret the views of these two physiologists to fit his own purpose, and to link them to both the Epicurean material soul and to Leibnizian motive force, which was probably influenced by Perrault's writings (Azouvi, 1982). The main point for him was to use any theory which could help him to deny the existence of an immaterial soul by ascribing activity and sensation to organised matter.

It is also significant that La Mettrie criticises his master Boerhaave for not recognizing «l'oscillation des corps organisés». It is particularly intriguing to discover that he doubtless took this notion, probably derived from Baglivi, directly from the works of the Parisian doctor Philippe Hecquet (1661-1737), mentioned shortly before the quoted passage. Hecquet, a famously devout Jansenist and pugnacious defender of mechanism, campaigned in favour of a simple, natural vegetarian life-style corresponding to that designed by god for humans before the flood. He condemned wine-drinking and advised drinking only water in order to preserve the natural oscillation (or «ressort») of the fibres which need water to keep their tonus. What he calls natural medicine is aimed at preserving the body according to god's plan, by keeping up

cette force innée, ou attachée par la création aux organes, & aux fibres qui doivent les mouvoir ou les faire agir pour l'exercice de leurs fonctions. C'est en particulier dans chaque partie du corps humain, & dans chaque fibre de chacune de ces parties, cette force de ressort, ce mouvement tonique, cette vertu systaltique avec laquelle naissent les

organes, dont elle fait la puissance & le mécanisme. (Hecquet 1733, 205-6)

He compares the natural oscillation of the fibres to that of a watch, as La Mettrie had done a few pages earlier, in a passage which seems to reproduce Hecquet's ideas:

Cette oscillation naturelle, ou propre à notre machine, & dont est douée chaque fibre, &, pour ainsi dire, chaque élément fibreux, semblable à celle d'une pendule, ne peut toujours s'exercer. Il faut la renouveler, à mesure qu'elle se perd; lui donner des forces, quand elle languit; l'affaiblir, lorsqu'elle est opprimée par un excès de force & de vigueur. C'est en cela seul que la vraie médecine consiste. (La Mettrie 1960, 186)

Despite Hecquet's theological aim, La Mettrie shows a certain sympathy for this Jansenist who, like him, attacked all sorts of charlatans, although in *L'Ouvrage de Pénélope*, he criticised his «enthusiasm» and dogmatism (La Mettrie 2002, 92-93). La Mettrie was also no doubt sympathetic to Hecquet's criticism of systems, Cartesian, Gassendist or chemical, and defence of observation, which did not however prevent him from developing his own system which attributed all diseases to air in the body (Hecquet 1738, see Brockliss 1989).

We can see from all this how La Mettrie, like other materialistic thinkers, used diverse and even incompatible medical theories which he believed could help him to demonstrate the existence of innate activity in matter. He was not dissuaded by the fact that the authors he quoted had specifically condemned the conclusion he drew from them. After all, he did the same thing with philosophical works, enrolling in particular Descartes who, he claimed, wished his readers to draw materialistic conclusions from his philosophy:

quoi qu'il chante sur la distinction des deux substances; il est visible que ce n'est qu'un tour d'adresse, une ruse de stile, pour faire avaler aux théologiens un poison caché à l'ombre d'une analogie qui frappe tout le monde, & qu'eux seuls ne voient pas. (La Mettrie 1960, 191)

Such declarations, taken together with the title of his most famous work, have led to this author being classified as a defender of «materialistic mechanism», who simply extended the Cartesian animal machine theory to humans. It should be clear from the quoted passage that such a view is somewhat simplistic. His aim was to show, by all possible means and using any possible theory, that matter is active and possesses within it all that is necessary to produce sensitive and intelligent beings. In

doing this he was following a long tradition of interest in active matter and also an ongoing debate, in which medicine was used to counter the official church doctrines.

Diderot and «le sens interne»

The question of sensitive matter, or rather of the existence of sensitivity in the smallest parts of organised matter, was one of Denis Diderot's particular preoccupations in his scientific and philosophical works. He worried at it persistently, and it is one of the central questions discussed in *Le Rêve de d'Alembert* (1769), a series of three dialogues discussing a material conception of humans, in which the Montpellier doctor Théophile de Bordeu acts largely as the author's mouthpiece. However, in order to show more clearly the importance of Diderot's study of medicine, I propose to go back and look at a much earlier work, dating from a period when, despite his participation in the translation of James's medical dictionary, he had a much vaguer grasp of the subject, and before he had read even the *Encyclopédie* medical articles written by Montpellier doctors. In *La Lettre sur les aveugles* (1749), Diderot puts atheistic arguments in the mouth of the dying blind mathematician Saunderson, which led to his own arrest and imprisonment at Vincennes. In this book, the discussion concerns more specifically the functioning of sensation and the role of the nerves and the brain in forming ideas. This discussion must be seen in the context of an important debate on the formation of ideas in the Lockean tradition, conducted notably by Condillac (*Essai sur l'origine des connaissances humaines*, 1746), Buffon and Diderot in the middle of the 18th Century. Its importance has been emphasized by Ernst Cassirer (Cassirer 1970, 117ff). All of these authors come back to the question posed by the Irish scientist William Molyneux, who asked Locke whether someone who was born blind and suddenly became able to see would be able to distinguish a sphere from a cube simply by looking at them. The cataract operation performed on a blind man by Cheselden, reported in the *Philosophical Transactions* in 1728, seemed to confirm Locke's negative answer. Voltaire quotes it in his *Eléments de la philosophie de Newton* (1738), and Berkeley claimed that this account confirmed the theory which he had proposed in his *Essay Towards a New Theory of Vision* (1709) (Degenaar 1996). However in 1745 La Mettrie, followed by Condillac at first (although the latter changed his mind in 1754) and by Diderot, proposed another interpretation. According to him, the blind man could not fail to recognise a globe which he already knew by touch once his eyes were physically capable of seeing correctly.

According to him, Cheselden's patient had not been able to distinguish these objects because:

ou on n'a pas donné le temps à l'organe dioptrique ébranlé de se remettre dans son assiette naturelle, ou à force de tourmenter le nouveau voyant, on lui a fait dire ce qu'on était bien aise qu'il dît,

because the witnesses were convinced that Locke's answer was the correct one. So, «il n'y avait qu'à lui donner le temps d'ouvrir les yeux, & de regarder le tableau composé de l'univers». (La Mettrie 1988, 119*-120*)¹ According to Marjolein Degenaar,

by drawing attention to the physiological condition of the eyes immediately following the operation and to the nature of the questioning of the patient La Mettrie gave a new boost to the discussions surrounding Molyneux's question. (Degenaar 1996, 67)

Once again, we see in La Mettrie's work the complex interrelation between medical data and philosophical interpretation, in particular the interpretation provided by a medical doctor concerned with physiological questions in order to demonstrate human «material unity».

Some critics have likewise seen in Diderot's 1749 work, written on the occasion of Réaumur's cataract operation on M^{lle} Simoneau, «une authentique théorie matérialiste» of sensation, which is also concerned with physiology. Gerhardt Stenger bases this claim above all on the fact that in this work Diderot proposes, against the immaterial soul defended by Condillac and Berkeley, «une sorte de 'sens interne', siège de la pensée, de la mémoire et de l'imagination mais qui n'a rien de spirituel» (Stenger, 1999, 107). It is this «internal sense» that we shall examine in more detail in what follows, as it is not as self-evident as might appear at first sight and I believe that the problems it raises provide an interesting example of the complex interaction between literature and medicine. An analysis of Diderot's use of the «internal sense» will reveal a certain confusion in his conception of human sensation and intelligence, which seems to indicate that in *La Lettre sur les aveugles* he was at an early stage in his elaboration of a materialistic conception of humans. What he writes in 1749 cannot be said to constitute a «theory», but rather a step towards the elaboration of a theory, which will only be developed later, mainly in the *Rêve*.

My analysis concerns the passage in which Diderot uses the expression «sens interne», given in the appendix to this article. After having

¹ On La Mettrie's contribution to the debate, see Glauser 1999, 395ff.

discussed the memory and the imagination of a person born blind who cannot colour his images, in order to emphasize that these ideas come from the sense of touch, Diderot continues immediately:

je ne connais rien qui démontre mieux la réalité du sens interne que cette faculté faible en nous ; mais forte dans les aveugles-nés, de sentir ou de se rappeler la sensation des corps, lors même qu'ils sont absents et qu'ils n'agissent plus sur nous.

And then he continues by developing an example concerning the sense of touch, in order to prove his point (Diderot 2000, 41).

In the various editions of this work the annotations indicate that the phrase «sens interne» is used for the *sensorium commune*, to emphasize the materialistic interpretation given to the *sensorium*, on the lines of La Mettrie². It should however be pointed out that this was far from being the general understanding of the *sensorium*, which was generally considered to be the seat of the soul or the organ which provided the soul with sensations. More importantly, however, this interpretation involves a certain number of difficulties. Firstly, if this is the case, it is difficult to see the relevance of his example. Diderot asks the reader to press their index finger against their thumb and then to separate them while closing their eyes; he claims that the feeling will last longer after the pressure has stopped. (Diderot 2000, 41). The point is to show the presence of feeling in the fingertips. Diderot compares the way we distinguish the presence of beings outside ourselves from their representation in our imaginations with the way a person blind from birth distinguishes feeling from the real presence of objects: it depends on the strength or the weakness of the sense-impression.

His purpose here is not clear, unless he simply wishes to emphasize that sensation is at the root of it all our ideas. In addition, when we look at the following paragraph, we can see that Diderot goes on to claim that a person born blind would deny that the brain is the seat of thought. The paragraph ends with the following statement:

Je ne craindrais point qu'un philosophe lui objectât que les nerfs sont les causes de nos sensations, et qu'ils partent tous du cerveau. Quand ces deux propositions seraient aussi démontrées qu'elles le sont peu, surtout la première, il lui suffirait de se faire expliquer tout ce que les physiciens ont rêvé là-dessus, pour persister dans son sentiment.

² See Diderot 1975-, IV, 31, 81; Diderot 2000, 176-7: here the editors refer to Locke's internal sense and to the internal senses as defined by the *Encyclopédie*, before moving on to discuss Newton.

Here he seems to be denying the existence of the *sensorium* as usually understood, as the seat of the soul and principle of feeling located in the brain (Canguilhem 1977, 98, Duchesneau 1982, 201). It is defined in the French translation (partially Diderot's work) of James's *Dictionary*, as follows:

le *Sensorium commune*, ou siège du sentiment, est ce qui reçoit les impressions des objets sensibles, qui lui sont apportées par les nerfs de chaque organe des sens, & qui est par conséquent la cause immédiate de la perception. (James 1748, 1479)

Immediately afterwards, the dictionary provides a definition of the external and then the internal senses, in the plural. The latter are described as follows (the formulation is almost exactly the same as that found in La Mettrie's translation of Boerhaave's *Institutions*, which is much clearer than Jaucourt's definition in the *Encyclopédie*):

ce sont les actions de l'âme ou de l'intellect, auxquelles il est excité par la perception des idées. On les réduit pour l'ordinaire à quatre: la mémoire, l'imagination, les passions & l'attention; quelques-uns y ajoutent la faim & la soif.

Guided by this definition, if we consider the context in which Diderot refers to the internal sense (in the singular), we are tempted to wonder whether he does not rather mean the imagination, understood in a physiological sense. For Condillac, «elle a lieu quand une perception, par la seule force de la liaison que l'attention a mise entre elle et un objet, se retrace à la vue de cet objet». The same author defines contemplation as follows:

elle consiste à conserver sans interruption la perception, le nom ou les circonstances d'un objet qui vient de disparaître. Par son moyen, nous pouvons continuer à penser à une chose au moment qu'elle cesse d'être présente. On peut, à son choix, la rapporter à l'imagination ou à la mémoire: à l'imagination, si elle conserve la perception même... (Condillac 2002, 26, 27)

This corresponds to Diderot's example of the way sensation continues. Note also that Condillac continues with a criticism of Locke's discussion of memory, linking it to the image left in the soul by perception, and when he distinguishes between the different types of perception, he emphasizes the tenacity of the feeling of touch.

The situation is thus more complicated than would appear at first sight. It is further complicated by the discovery that the internal sense in

the singular as opposed to the plural is described at length in Buffon's *Discours sur la nature des animaux*, first published in 1753 in volume 4 of his *Histoire naturelle*³. Buffon explains that the animal's brain is a «sens intérieur et général qui reçoit toutes les impressions que les sens extérieurs lui transmettent», and that

Ce sens interne est non seulement susceptible d'être ébranlé par l'action des sens et des organes extérieurs, mais il est encore, par sa nature, capable de conserver longtemps l'ébranlement que produit cette action; et c'est dans la continuité de cet ébranlement que consiste l'impression, qui est plus ou moins profonde à proportion que cet ébranlement dure plus ou moins longtemps. (Buffon 1954, 323)

He explains that this interior or internal sense in the animal differs from its external senses only by its capacity to conserve its agitation or the sensations it has received. This material internal sense, similar to the external senses, also exists in humans but it is subordinated to the soul, a superior sense, which allows humans to compare sense impression and form ideas, and thus possess memory and imagination. Given that Diderot also emphasizes the capacity to preserve sensations after their external cause has disappeared, the inescapable conclusion is that Diderot's internal sense is the same as Buffon's. The apparent difficulty with this interpretation is that Buffon's text appeared in 1753, four years after Diderot published the *Lettre sur les aveugles* in early June 1749, which was even before the publication of Buffon's first volumes. However, it has been established that Buffon wrote the first volumes of his natural history much earlier, that they were given to the printer by 1746 and that the publication of volume IV containing the *Discours sur la nature des animaux* was delayed (Grinevald 1992, 633). It has also been established that Diderot and Buffon were very close during those years, and Jacques Roger has emphasized the important role undoubtedly played by Diderot's discussions with Buffon in influencing the writing of *La Lettre sur les aveugles* (Roger 1963). One may therefore ask whether Diderot indeed wishes to emphasize the role of the material brain and, by referring to Buffon's material «internal sense», he is not in fact affirming the existence of a material *sensorium commune*. After all, for Buffon this internal sense is material, even if his explanation is accompanied by the claim that humans possess an immaterial soul responsible for thought, which distinguishes them from animals who possess only this material internal sense. Diderot's use of the notion, however, could indicate the desire to

³ This is mentioned in none of the editions of *La Lettre sur les aveugles* that I have seen.

propose a materialistic explanation of intellectual functions by dispensing with the immaterial human soul. But there remains the problem of the following paragraph which seems to deny that the brain acts as a general sensory collecting the sensations transmitted by the nerves or that the seat of sensation is in the brain. One is forced to the conclusion that Diderot has combined uneasily two different conceptions: on the one hand, the internal senses (in the plural) meaning the imagination and the memory, and on the other Buffon's use of the internal sense (in the singular).

In *La Lettre sur les aveugles* Diderot does seem to be trying to deny the existence of an immaterial soul in two different ways: on the one hand, rather like La Mettrie in 1745, by showing how all our perceptions and ideas are conditioned by our senses and thus subordinated to the physical state of the organs; and on the other by suggesting that the brain is not the seat of the soul (generally called the *sensorium commune*) but that the (possibly material) soul is present throughout the body, in the organs of feeling. It is interesting to note that Buffon seems to have come to a similar conclusion concerning the brain, for in volume 7 of his *Histoire naturelle*, published in 1758, he places the centre of feeling in the diaphragm and compares the brain to the soil in which the nerves are like plants; thus

Le cerveau, au lieu d'être le siège des sensations, le principe du sentiment, ne sera donc qu'un organe de sécrétion et de nutrition, mais un organe très essentiel, sans lequel les nerfs ne pourraient ni croître ni s'entretenir. (Buffon 1954, 370)

In 1749 Diderot is clearly not following the physiological arguments of La Mettrie and his predecessors who make the brain the general sensory, the material seat of thought in order to dispense with the immaterial soul. In *L'Histoire naturelle de l'âme* La Mettrie refers to the theories of the Stoics and «some other Moderns» who thought that «l'âme sentait dans toutes les parties du corps». Amongst others, he quotes Claude Perrault whose arguments in this connection particularly use the example of touch, said to be the basis of all the other senses (Perrault 1680, IV 59ff). Perrault criticized the theses of «modern philosophers», claiming:

Que l'âme qui est unie à toutes les parties du corps, est affectée par les impressions des objets dans les organes, & non dans le cerveau; lequel n'a point d'autre office que de préparer les esprits nécessaires aux organes, pour être capables de sentiment. (Perrault 1680, II, 265)

However, La Mettrie only refers to Perrault in order to refute his theory, insisting «l'âme ne sent donc pas dans le lieu même où elle croit

sentir». If it were the case, he explains, the whole animal would not be aware of these sensations (La Mettrie 1988, 32*). Diderot, however, seems to be attracted by this sort of hypothesis. Is Diderot perhaps tempted by some sort of similar conception of a material soul spread throughout the body rather than by the emergentist conception expounded later in the *Rêve*? This might seem consistent with the Epicurean accents of Saunderson's speech and with a certain conception of active matter; the mathematician speaks of matter «en fermentation» (Diderot 2000, 62). It is difficult to be sure and one may instead wonder whether Diderot has a completely clear idea of the implications of his position. There is no doubt that his material explanation of the internal senses bears some similarities with La Mettrie's physiological explanation of the imagination. La Mettrie explains it by the internal senses affecting the sensorium, in the same way as the external ones do:

ils ne diffèrent les uns des autres, ni par la façon dont on pense, qui est toujours la même pour tout le monde, ni par le changement qui se fait dans le *sensorium*, mais par la seule absence d'objets externes. (La Mettrie 1988, 56*ff)

Diderot's arguments in *La Lettre sur les aveugles* undoubtedly betray a desire to find a material explanation for sensation, but they remain confused as he does not yet seem able to formulate a clear physiological model for it.

If one considers the probable effect produced on Diderot by his reading of La Mettrie's *L'Histoire naturelle de l'âme* and *L'Homme machine* the radical implications of his 1749 work cannot be denied, even if he was as yet unable to formulate them clearly. He did not do so until *Le Rêve de d'Alembert*, in a way which was much closer to La Mettrie's hypothesis (even though this work, with its daring developments which push hypotheses to their extreme possibilities, was much more fertile). In the later work Diderot emphasized the role of the brain, the «centre of the network», and the nerves, using the striking image of the spider and its web which has attracted much commentary. In this connection there is, however, another curious fact which also seems to have escaped critical attention, which is that in Diderot's *Eléments de physiologie* written shortly afterwards, consisting of notes for a planned work on physiology, he uses to describe the same network not the image of a spider but that of a crayfish:

Donc tout le système nerveux consiste dans la substance médullaire du cerveau, du cervelet, de la moelle allongée, et dans les prolongements de cette même substance distribuée à différentes parties du corps. C'est une écrevisse, dont les nerfs sont les pattes, et qui est

diversement affectée selon les pattes. Ces pattes sont diversement organisées, de là leurs fonctions différentes. Extrémités motrices, et contractiles. (Diderot 1975-, XVII, 355)

One can wonder as to the implications of this change, introducing a much less evocative image than that of the spider's web which, as Georges Poulet has emphasised, conjures up infinite networks and a multitude of intertwined webs throughout the world (Poulet 1979 136). Diderot may have been influenced by the description in Bonnet's *Considérations sur les corps organisés* of how the crayfish's limbs grow back after amputation (Bonnet 1985, 246ff), a description which he had already quoted in an earlier section of the same work (p. 319). One could also point out that in Buffon's discussion of sensation in 1758, already referred to, he mentions the crayfish's capacity to regenerate its members as an indication that it possesses much less feeling than humans (Buffon 1954, 368). It is perhaps this example of nature's fecundity that attracted Diderot's attention; a part of the body that can grow again after being cut off might seem more appropriate to evoke the nerves than a web, which is inert matter once it leaves the spider's body, its only property being to transmit sensation by vibration.

Whatever one may think of this image, Diderot's *Rêve de d'Alembert* undoubtedly shows how important was his study of Montpellieran physiology in providing him with a deeper knowledge of the subject on which he could base the arguments of this work. Here and in his *Eléments de physiologie* he follows the model of the brain as the material sensorium and seat of feeling and thought already developed by La Mettrie. The different elements of this model of the «unité matérielle de l'homme» began to be assembled much earlier but it was Diderot's study of medical works which allowed him to develop a coherent theory. In *Le Rêve* Bordeu emphasizes the material unity of the individual and that consciousness is in only one place in the body, «au centre commun de toutes les sensations, là où est la mémoire, là où se sont les comparaisons» (Diderot 1975-, XVII 175) — which, as we have seen, La Mettrie considered to be undermined by theories of a material soul like Perrault's, and perhaps Diderot's in 1749.

Beyond these particular examples concerning some of the medical sources of 18th-century materialism, this article has tried to throw light on the complexity of the ways in which medicine and literature interact and the role played by medicine in the elaboration of more or less coherent materialistic theories of humans. One cannot understand the emergence of materialism in the 18th Century if one ignores this crucial factor. For this, one must go beyond generalisations to a detailed study of the works concerned and the circumstances of their elaboration.

Appendix

Je ne connais rien qui démontre mieux la réalité du sens interne que cette faculté faible en nous, mais forte dans les aveugle-nés, de sentir ou de se rappeler la sensation des corps, lors même qu'ils sont absents et qu'il n'agissent plus sur eux. Nous ne pouvons faire entendre à un aveugle-né, comment l'imagination nous peint les objets absents, comme s'ils étaient présents; mais nous pouvons très bien reconnaître en nous la faculté de sentir à l'extrémité d'un doigt, un corps qui n'y est plus, telle qu'elle est dans l'aveugle-né. Pour cet effet serrez l'index contre le pouce; fermez les yeux; séparez vos doigts; examinez immédiatement après cette séparation ce qui se passe en vous, et dites-moi si la sensation ne dure pas longtemps après que la compression a cessé; si pendant que la compression dure, votre âme vous paraît plus dans votre tête qu'à l'extrémité de vos doigts; et si cette compression ne vous donne pas la notion d'une surface, par l'espace qu'occupe la sensation. Nous ne distinguons la présence des êtres hors de nous, de leur représentation dans notre imagination, que par la force et la faiblesse de l'impression: pareillement, l'aveugle-né ne discerne la sensation d'avec la présence réelle d'un objet à l'extrémité de son doigt, que par la force ou la faiblesse de la sensation même.

Si jamais un philosophe aveugle et sourd de naissance fait un homme à l'imitation de celui de Descartes, j'ose vous assurer, Madame, qu'il placera l'âme au bout des doigts; car c'est de là que lui viennent ses principales sensations et toutes ses connaissances. Et qui l'avertirait que sa tête est le siège de ses pensées? Si les travaux de l'imagination épuisent la nôtre, c'est que l'effort que nous faisons pour imaginer, est assez semblable à celui que nous faisons pour apercevoir des objets très proches ou très petits. Mais il n'en sera pas de même de l'aveugle et sourd de naissance: les sensations qu'il aura prises par le toucher, seront, pour ainsi dire, le moule de toutes ses idées; et je ne serais pas surpris si après une profonde méditation il eût les doigts aussi fatigués que nous avons la tête. Je ne craindrais point qu'un philosophe lui objectât que les nerfs sont les causes de nos sensations, et qu'ils partent tous du cerveau: quand ces deux propositions seraient aussi démontrés qu'elles le sont peu, surtout la première, il lui suffirait de se faire expliquer tout ce que les physiiciens ont rêvé là-dessus, pour persister dans son sentiment.

(Diderot 2000, 41-42).

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