



## Roots of French vitalism: Bordeu and Barthez, between Paris and Montpellier

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### Abstract

This article analyzes several French eighteenth century physiological theories that later on were classified as vitalist. The overall background is set by the tradition of Montpellier medical school, in particular by the physiological and medical ideas of Théophile de Bordeu. Paul-Joseph Barthez was initially trained in this setting, however, his conception of the autonomy of life was also heavily influenced by the circle of Paris encyclopedists. For this reason, Barthez's elaboration shows elements of continuity and discontinuity regarding both the notion of human being as represented in the classification of sciences of the *Encyclopédie*, and the typical Montpellier tradition.

Keywords: vitalism; Théophile de Bordeu (1722-1776); Paul-Joseph Barthez (1734-1806); France; eighteenth century.

The term vitalism is strongly evocative of Montpellier eighteenth-century medicine. As a fact, the adjective vitalist – which seemingly appeared before its corresponding noun – was minted by Charles-Louis Dumas (1765-1813) in 1800, precisely to allude to Montpellier medical tradition, and more particularly to the ideas of Paul-Joseph Barthez (1734-1806), although his name is not explicitly mentioned. From this time onwards, the term vitalism was applied to such wide variety of notions, that reputed historian of biology William Coleman (1977) felt the need to call for a thorough review of this term, since “no expression in the language of biology is so ambiguous and open to misuse or abuse” (p.145) and that “without full and explicit qualification [its] employment is usually pernicious” (p.12).<sup>1</sup>

This state of affairs had not changed by the 1990s, as it is shown by the symposium *Vitalisms from Haller to the Cell Theory* held in Zaragoza, whose purpose was precisely to define the comprehension of vitalism as an approach to the life sciences developed in the eighteenth and nineteenth centuries. This (confused) state of affairs is illustrated by scholar Jacalyn M. Duffin (1997, p.221-222):

Vitalism is mind, free will, as opposed to determinism; but it is also determinism, intuition, or teleology; it is the recognition of a moral soul that influences physical being; it is holism or monism and an attack on Cartesian dualism; it is Aristotelian or Drieschian entelechy; it is the opposite of mechanism; the opposite of materialism; and the opposite of existentialism; it is both endorsed and refuted by Darwinian evolution; it is bioelectricity; the biological cognate of gravity; it is the opposite of scientific arrogance; it is scientific heresy.

Therefore, it is possible to conclude that Coleman’s wish was not fulfilled. Recently, Silvia Waisse-Priven (2009) attempted to map out the history of vitalism mainly in German-speaking areas, whereas the project of scholar Roselyne Rey (1997) to draw the “force lines” of studies on vitalism mostly focusing on French authors was interrupted by her early death.<sup>2</sup> This article aims at a deeper understanding of these matters by approaching French vitalism, and more particularly the views of Théophile de Bordeu (1722-1766) and Paul-Joseph Barthez.

### **Montpellier school of medicine**

Since its foundation in the Middle Ages (there are mentions dating from the tenth century) and due to its geographical location, Montpellier has always been a port. For this reason, continuous circulation of people and mixing of cultures were its main traits, further strengthened by intense trade activities. As the capital of Languedoc, it is an important urban center even today from the political, administrative, economic, religious and educative perspective, among several others.

Montpellier was also known as a ‘medicine city’. Its intense trade activities made it an important crossroads for peregrines, crusaders and other types of travellers. This unique combination exacted also unique requirements of medical assistance giving rise to several charity institutions and hospitals, as well as to its medical school (Williams, 1996, p.205-207).

At an unknown date, the counts of Montpellier admitted Arabic and Jewish doctors from Spain, who began teaching medicine. By the early thirteenth century, the medical school had become one of the four major Western Europe medical teaching centers and thus remained for the next five centuries. To illustrate the reputation of this school, one may remember that six among the First Physicians (the French king's personal doctors) between 1610 and 1752 were Montpellier graduates, as it was the case of about half (45.9%) of French doctors between 1803 and 1806 (Raynaud, 1998, p.726; Williams, 1996, p.218). Some of Montpellier most famous physicians were Laurent Joubert (1529-1682), Lazare Rivière(1589-1655), Joseph Pitton de Tournefort (1656-1708), Théodore Turquet de Mayerne (1573-1654 or 1655), Jean Astruc (1684-1766), Pierre-Jean-George Cabanis (1757-1808), Philippe Pinel (1745-1826) and Marie François Xavier Bichat (1771-1802).

Since its earliest times, Montpellier medical school had unique features. Teaching was never bookish and the statutes of 1200, for instance, required students to take a mandatory leave and travel away from the city to perform clinical practice activities (Nance, 2001, p.68).

Down through the centuries, Montpellier maintained its fame as a center for medical teaching open to innovation, where equipment was constantly updated and progress-minded teachers were hired. According to Coleman (1974, p.400), this process developed within an intellectual context where humans were seen as a part of the natural world, that is, as 'rational animals', whose health could thus be preserved by medicine. Starting in the seventeenth century at least, Montpellier physicians prioritized the data collected through the senses (Nance, 2001, p.68).

The scholarly literature tends to identify Montpellier as one of the major centers where the life sciences approach later known as vitalism first emerged. On the grounds supplied by the strong practical emphasis of teaching – which led to prioritize the singularity of each individual patient over the general categories of medical theory – this assimilation was strengthened and renovated by the incorporation of Georg E. Stahl (1659-1734) animistic ideas, which were transferred from Halle to Montpellier by François Boissier de Sauvages (1706-1767). The autonomy of life regarding the notions and laws used to explain the phenomena of lifeless matter was stressed by Bordeu. Eventually, the origin of the term vitalism itself was associated with a member of this school, namely Barthez.

### **Vitalism at Montpellier**

By mid-eighteenth century, when the ideas later labeled vitalist first emerged, Montpellier school was divided among a multitude of conflicting tendencies ranging from Stahl's animism, introduced by Sauvages, to the mechanism of Antoine de Fizes (1689-1765). One could also note the influence of Albrecht von Haller (1708-1777), a German-Swiss who had described properties that were inherent to the living fiber but non-existent in lifeless matter: irritability (contractility), sensitivity, and immanent force (*vis insita*). This was the context within which Louis de La Caze (1705-1765), Gabriel F. Venel (1723-1775), and Bordeu (1755, p.455-456; Lordat, 1818, p.43-44) developed their ideas.

According to Rey (2000, p.177), the individual contributions of La Caze and Bordeu are difficult to distinguish given how closely together they worked, sometimes bringing in Venel as well.<sup>3</sup> This group is the source of one of the major formulations that later were held as typical Montpellier vitalism and that included the elements we are about to explore.

First, a criticism of the application of physics, mechanics and chemistry to medicine, to posit the phenomena available to observation in both, health and disease, as the authentic foundation of this field. For example, in Bordeu's words (1818, v.2, p.1007): "One must agree on that this aim will never be reached – neither through anatomy or chemistry, nor through physical or academic experiments. Only by following the course of diseases and pondering on them we will grasp the true composition, combinations, and true nature of the animal humors."

Secondly, two essential properties of the living human body were postulated: motion and sensation (Rey, 2000, p.183). According to Pierre Flourens (1794-1867), a Montpellier doctor who wrote in 1858, although both Bordeu and Haller stressed vital properties, the main factor putting them at odds and thus defining the line of studies at Montpellier, was that the former placed greater emphasis on sensitivity and the latter, on irritability.

Bordeu displayed keen interest in this topic ever since writing his doctoral dissertation in 1742, entitled "On sensitivity in general", where he challenged the three views prevalent at that time, namely the traditional doctrine of animal spirits originated in Galen; Stahl's animism - which attributed all phenomena to the soul; and the mechanism of Hermann Boerhaave (1668-1738).

Bordeu deals summarily with the first two approaches, preferring to concentrate on refuting Boerhaave's theory on glandular secretion, which explained it as a mere mechanical effect secondary to the physical compression of these organs. Bordeu contends that no gland in the human body lends itself anatomically to mechanical compression and he deduces that this process has a very different and higher-order cause, namely nerve-mediated sensitivity. This is simply and evidently proved, he argues, by the fact that our mouth waters as soon as we sense the odor of food, tender emotions move us to tears, and so forth (Flourens, 1858, 2nd part, p.43-50). After establishing the existence of a general sensitivity common to all parts, and a particular sensibility specific to each organ, Bordeu concludes: "Secretion is reduced to a kind of sensation: the parts that are able to excite this sensation will pass, while the others are rejected; each gland and each orifice will have its own particular taste" (cited in Flourens, 1858, p.169).

In the same line, Henri Fouquet (1727-1806) acknowledged both forces, sensitivity and motion; however, following Bordeu, he prioritized the study of sensitivity, to which he dedicated a 47-page article in the *Encyclopédie* (Dulieu, 1952, p.20). In this article, he minted an expression that made history, namely, "little lives": "When sensitivity is distributed across all the organic parts of the body, each organ lives or senses in its own manner and the concurrence or addition of these specific lives constitutes life in general, just as the harmony, symmetry, and arrangement of these small lives (*petites vies*) constitute health" (cited in Flourens, 1858, p.169).

Lastly, the third feature of note is the notion of organization together with a particular interpretation derived from the idea of organic molecules formulated by Georges-Louis de

Leclerc, Count Buffon (1707-1788). According to this view, life in the embryo lies within the organic molecules that form the seeds; then they develop to give rise to the different organs of the body, which results in two orders of 'specific lives': the specific lives of the organic molecules and the specific lives of the organs; the fusion of them all results in the life of the organism as a whole.

This is the reason why 'Montpellier vitalists' – Bordeu, Fouquet, and Jean J. Menuret (1733-1815), among others – gave paramount importance to sensitivity, defined as the outcome of the multiplication of specific lives, or little lives, within the organism. In other words, the body should be considered "an infinite assemblage of little bodies, all similar, all equally animated, all equally alive, each with a life, an action, a sensitivity, a functioning, and its own specific movements, and at the same time a general life, sensitivity, etc., common [to all]" (Menuret, 1765, p.240a).

This model is clearly illustrated by means of Bordeu's comparison between an organism and a swarm of bees.

In order to perceive *the particular action of each part* of a living body, we compare it to a swarm of bees, assembled in a cluster and hanging from a tree like a bunch of grapes. One cannot consider wrong what a celebrated ancient author said of the organs of the lower abdomen: it was an *animal in animalis*. Each part is, so to speak, certainly not an animal, but a *species of an independent machine*, which in its own way contributes to the general life of the body. Thus, to pursue the comparison of the cluster of bees who must act together in order to stay fast, there are some who are attached to the first ones and so forth; all cooperate to form a solid enough body; each one, however, has, in addition, its *specific action* [emphasis in the original].<sup>4</sup>

Note that with this comparison Bordeu stresses the harmony of the whole as much as the autonomy of each part. According to Rey (2000), one must look in La Caze for the origin of these ideas on organization, since he defined life as a set of many movements "linked by mutual dependence" (p.160).

One can thus say that two overriding notions characterize the medical school of Montpellier in the second half of the eighteenth century: one, organization, that is, the relationships between the individual organic parts that form a harmonious whole; and two, the animation of life, which cannot be explained by means of the notions, methods, and laws of lifeless matter but by forces or principles unique to life. Due to the latter tenet, Montpellier doctors were retrospectively called vitalists.

On the other hand, their interest in human physiology was not exclusively academic, but also aimed at application to clinical practice. For this reason it is worth to compare Montpellier to Stahl-inspired animist clinical practice in order to better understand its particular nuances.

### **From Stahl's animist to Montpellier's vitalist clinical practice**

Since Stahl's school held that the soul ruled over both health and disease, it saw no qualitative difference between either state, which ran against the traditional view defining health as the 'natural' state of the body and disease as its 'contra-' or 'pre-ter-natural' state.

For Stahl's followers, the soul causes and regulates the motions of the body in order to preserve its health, and analogously organizes similar motions to restore health (Stahl, 1831-1833, v.1, p.230, 474).

The symptoms of disease merely reflected the reaction of the soul against the offending cause and consequently indicated the path to recovery; doctors could make profit of symptoms to understand the motions of the soul (Stahl, 1831-1833, v.1, p.242, v.2, p.306). Therapeutics, in turn, ought to strengthen a weakened soul or to soothe it when disruptingly vigorous, according to the indications supplied by symptoms (v.1, p.132, 490).

Some components of Stahl's doctrine were kept at Montpellier. For example, Bordeu (1818, v.2, p.832) preserved the notion of continuity between the states of health and disease, while at the same time he emphasized the role played by the heart, the brain, and the stomach in the origin of disease. This is to say, according to Bordeu, disease is caused by disorders in the mutual relationships among these three organs.

Here, once again, one can notice how Montpellier school stressed the notions of organization and organic relationships. For this reason, together with the examination of patients, Bordeu favored analysis of the pulse as a diagnostic tool. In this regard, he published in 1750 *Recherches sur le pouls par rapport aux crises*, and together with his disciples he was able to distinguish over 400 varieties of pulses.

Just as Stahl, also Bordeu asserted that the doctor's task is to aid nature. But since Bordeu also thought that Stahl's posture was dangerously passive, whenever a patient showed signs that intervention was required, Bordeu relied on a full arsenal of therapeutic resources to restore functions, eventually including bleeding (Bordeu, 1818, v.2, p.845-846).

### **Paris, the *Encyclopédie*, and the Science of Man**

In the second half of the eighteenth century, Paris was a beacon for anyone who wanted to shine in the political or intellectual stage. Thus, it is understandable that *montpelliérains* like Bordeu, Venel, and Barthez in time moved to the capital.

Between the late 1740s and the 1750s, these three joined the circle of the Encyclopedists – Bordeu and Venel through contact with Denis Diderot (1713-1784) and Barthez, through Jean Le Rond d'Alembert (1717-1783) and physician Camille Falconet (1716-1791) (Williams, 2003, p.168). As we will see later, this network of influences is particularly visible in the work of Barthez, member of a younger generation and then just embarking on his career.

Entitled *Nouveaux éléments de la science de l'homme*,<sup>5</sup> Barthez's main work begins with the following statement: "The Science of Man is the first of the sciences" (Barthez, 1806, v.1, p.1). However, since nowhere does he clearly state his understanding of this science of man, if we are to better define the concept, we must not only analyze his text, but likewise explore the context and sources that were its wellspring.

Since the relationship between Barthez and d'Alembert is well known, right from the outset our research turned quite naturally to the *Encyclopédie*. Indeed, its organization system, entitled "Système figure des connaissances humaines" (Diderot, D'Alembert, 1751), describes the science of man as one of the branches of knowledge. The ubiquitous influence of the *Encyclopédie* on the intellectual world of eighteenth-century France, and especially

of its 'tree of knowledge', drawn from Francis Bacon (1561-1626), impregnated much of European thought (Bacon, 1952, p.32ff.), and perhaps this explains why Barthez felt it unnecessary to identify this source. The same cannot be said for a modern scholar, and thus it is worth to take a brief look at this tree of knowledge.

The first criterion of classification concerns the faculties of the mind, and thus the sciences are divided into Sciences of Memory, Sciences of Reason and Sciences of Imagination. History belongs with Memory, while Poetry belongs with Imagination. The Sciences of Reason (Philosophy) are subdivided into General Metaphysics (Ontology or Science of Being in General); Science of God; Science of Man; and Science of Nature. Let us examine the last two categories in detail.

While the science of man is restricted to the study of the human soul, logic, and morals, the physical aspects of the human being are implicitly linked to his 'animal' nature and are consequently allocated as objects of zoology, thereby including medicine as well. In *Nouveaux éléments*, Barthez (1806) focuses precisely on this conception of the science of man and states his intention to reformulate and expand it, based on the *montpelliérain* notion of the wholeness of the human being synthesizing its moral and physical aspects.<sup>6</sup> In other words, Barthez disagrees with the *Encyclopédie* proposed separation between the spiritual and moral aspects of the human being on the one hand, and his physical aspects, on the other (v.1, p.21). The author explains that this new version of the science of man may be of some interest to "metaphysics and morality", but more than that it will also satisfy the fundamental goal of providing a firm foundation for the healing art (v.1, p.1).

For these purposes, the science of man quite naturally relies on metaphysics but also on physics and mechanics, given that the latter explain the organs and their functions. This statement may be surprising, considering that the Montpellier school held as irrelevant or even wrong the inclusion of the sciences of lifeless matter within the domain of the life sciences. Herein lies a first element of the break between Barthez and the school tradition within which he was initially trained, and thus we would do well to investigate the possible sources of this rupture. However, before moving on to these considerations, we must first address another important aspect of Barthez, namely his philosophical method.

### **Barthez and the "good method to philosophize"**

Barthez describes himself as the Bacon of the Science of Man because he, like the English philosopher, thinks it necessary to renovate the "method to philosophize". To do so, he calls Ockham's principle in to limit the necessary number of principles (general laws) to a minimum. Reflecting the context of his day, he presumes that sound knowledge is grounded on the natural phenomena accessible to our senses as well as on the laws that can be directly inferred from them; further, he warns against generalized and premature conclusions based on a small set of facts. Lastly, he relies on d'Alembert and mathematician Roger Cotes (1682-1716) when he puts forward the method he considers correct: an initial, analytical phase, which moves from the phenomena as experienced and observed to the laws that nature uses to produce them, followed by a synthetic phase, in which these laws are used to explain other phenomena (Barthez, 1806, v.1, p.16-17, 21-22, 24).

It is worth to look closer into this epistemological matters. Barthez defines natural philosophy as the inquiry into the causes of the phenomena that can be known from experience. He warns, however, that experience cannot teach us how these causes essentially act, but only the order and rules that phenomena follow as they succeed one another along time. Therefore, the term cause (and synonyms such as force, principle, power, faculty, etc.) applies to whatever makes one phenomenon follow another in time. Moving up inductively through this chain of causes, one reaches the most general cause among all, which Barthez calls experimental cause.

By the same token, he states: "Explaining a phenomenon always means demonstrating that the facts presented by it unfold in an order analogous to the order followed by other, more familiar and better known facts" (Barthez, 1806, v.1, p.7-8). By "combining and calculating" facts that have been properly observed and linked to each experimental cause, one may discover the secondary laws of this same cause, making it possible to define new orders of phenomena dependent upon these laws (v.1, p.14-16).

Nevertheless, the principle (cause, force, etc.) that Barthez places at the center of his system is a being of reason, namely the "vital principle". As a fact, this principle is so essential to his thought that he defines the science of man itself as the "knowledge of the laws followed by the Principle of Life inside the human body" (Barthez, 1806, v.1, p.35). Here one can see why Barthez felt compelled to make his philosophizing method explicit. With this in mind, we will return to our earlier questions about the sources that led Barthez to reformulate the traditional views about the autonomy of life.

### **Barthez and the vital principle in the human being**

Barthez's formulation grew out of a critique of coetaneous views on physiology (i.e., the science of human nature). Since mechanism had been consistently refuted by animism, Barthez focuses on the mistakes of the latter.

His line of argument boils down to virtually one single assertion: the voluntary and involuntary movements of the body cannot be attributed to one single entity, namely the "thinking soul." Thus, "given the current state of our knowledge," one needs to posit two different principles that do not operate on mechanistic grounds and whose intrinsic nature is hidden to us, viz., the thinking soul and the principle of life (Barthez, 1806, v.1, p.20).

Barthez stresses that nothing can be affirmed about the intimate nature of the vital principle and that the general laws that rule over its forces inside human beings are the only possible subject of research, i.e., the faculties of this principle that serve each function of the body and their modifications. By the same token, disease is nothing more than an affection of the vital principle (or, more rarely, a consequence of the will of the thinking soul) or physical damage of the organization of the body parts. (Barthez, 1806, v.1, p.28, 43).

Barthez defines physiological causality as a 'chain' of instances stretching from God, the "Author of nature", down to the phenomena perceptible by the human senses; such instances he names primordial laws, vital principle, and forces of the vital principle. This is how the actions of the matter composing living bodies are determined and modified. It must be noticed, however, that according to Barthez no link in this causal chain is open



to inquiry, which thus is limited to the phenomena perceptible by the human senses and the laws inferable from them.

Consequently, the objects proper to the science of man are the forces of the vital principle, the mutual connections between them (“sympathies”), their assemblage into a ‘system’, their modification according to temperament and age, and their extinction at death (Barthez, 1806, v.1, p.33). Here there is simultaneous continuity and discontinuity regarding the traditions of both Paris and Montpellier. From the former, Barthez keeps the notion of a science of man, albeit altered as to its object, and thus, also as to its place in the tree of knowledge. From the latter, the view about the autonomy of life is kept, however rather than rejecting the inclusion of the sciences of lifeless matter within the sciences of life, Barthez now demands their very inclusion, as a function of the synthesis he had accomplished of the physical and moral aspects of the human being. Barthez also deems the singularity of the living being to be a single principle, i.e., a vital principle, placed between the thinking soul and the matter composing the body. Here it should be noted that the term vital principle already had a history in Montpellier. Bordeu, for instance, observed that Fizes had used it, albeit vaguely defining it as omnipotent, this is, as able to effect anything, “both what is black and what is white” (Bordeu, cited in Flourens, 1868, p.94ff).

Barthez makes use of many contemporary themes and styles to explain the principles of human motion, which led modern scholars to identify a variety of influences in his work. Reference has been made, for example, to Newtonianism, since Barthez alludes to an indefinable ‘hidden’ agent (such as gravity) as the origin of all motions in a living body (Wolfe, Terada, 2008, p.562). However, Barthez was seemingly only interested in describing the interaction among the several principles and forces in the body as a whole, rather than in any ‘hidden’ element whatsoever.

Barthez first addresses this issue in connection with his previous assertion on that human knowledge is restricted to the phenomena exhibited by living bodies to the senses, whence the question: how can the principles of motion be inferred? The answer entails a comparison between solid bodies, whose property is inertia, and more subtle and fluid bodies, just as the “sensitive movements of the air, which is invisible, lead us to imagine that the hidden being that endows each animal with motion and life, and which fades away after death, and which is an ethereal substance” (Barthez, 1806, v.1, p.63).

This point takes Barthez to a comprehensive discussion of the notion of the soul as represented by various religious and philosophical systems. His thinking, however, follows another pathway. Barthez abstracts all the sensitive qualities from bodies (since he judges them accidental to their matter) and thus arrives to the notion of a non-material substance (v.1, p.74-75). He further adds that all authors who in the course of time admitted the existence of immaterial substances – whom he qualifies as Aristotelian and Cartesian – also distinguished a third instance other than mind and body in human beings (v.1, p.76-77). Also here Barthez is mostly concerned with the animists, especially with Stahl’s followers, in order to introduce further arguments supporting the distinction between thinking soul and vital principle, now grounded on the notion of freedom (v.1, p.85).

Despite in *Oratio academica de principio vitali hominis*, dated 1773, Barthez had stated that in the human being the vital principle does not depend on either the mechanism of the body or the affections of the thinking soul, in each further edition of *Nouveaux éléments*, he adds more reasons to distinguish between vital principle and thinking soul. For example, in the second edition, dated 1806, he includes an argument by German scholar Friedrich K. Medicus (1813-1893): “If the Vital Faculty belonged to the Soul, it would possess characteristics fully different from the ones of the other faculties; for this Vital Faculty never tires in its functioning; it is perfect from the first moment of life and does not require years to develop etc.” (Barthez, 1806, v.1, p.76).<sup>7</sup> Furthermore, the Stahlians were forced to attribute disease to ‘errors of the soul,’ which was a contradiction in terms. Lastly, Stahl’s followers represented the soul as a simple being, a notion that was incompatible with the manifold motions and sensations observed in human beings at each instant of their lives (v.1, p.100-109). Therefore Barthez (v.1, p.94-95) concludes:

It seems to me that one cannot help but distinguish the Vital Principle of Man from his thinking Soul. This is an essential distinction, whether one imagines that these two principles exist by themselves and are substances, or whether one supposes that they exist as attributes and modifications of one and the same substance... It makes little difference if one calls the Vital Principle Soul, Arché, Nature, etc., but what is absolutely essential is that no connection is ever drawn between the determination of this principle and the affections that derive from the faculties of prudence or any other faculties attributed to the Soul.

Barthez next set about establishing whether the vital principle exists unto itself or if conversely, it is an emergent property of the organization of living matter, as Bordeu, for example, argued. Barthez of course rejected the latter idea, since he believed that this principle was the origin of the organization of matter and, thus, could never be its result. At the same time, he devoted himself to a lengthy and thorough discussion of the various modalities of self-subsistence of this principle.

The first possibility would be to see the vital principle as a substance. Based on the ideas developed by John Locke (1632-1704) – here again we note the distinct influence of British empiricism –, Barthez discusses this option at length in the explanatory notes added to the second edition of *Nouveaux éléments*. Citing Willem s’Gravesande (1688-1742), renowned divulger of Newton’s ideas in the Continent, he concludes that substance itself is unknowable and that we can only know some of its properties (Barthez, 1806, v.1, p.86ff).<sup>8</sup>

In the body of his book, however, Barthez proclaims his strong hypothesis: a general law established by the Author of nature establishes a vital faculty (i.e., the vital principle) endowed with motor and sensitive forces, which determine the particular combination of matter that composes each body.

For Barthez, this vital faculty is “sufficient reason” to account for the sequence of motions an animal needs throughout its life. Thus, he has no objections to admit the possibility that “God [joined] the combination of matter needed to form each animal and a Life Principle that subsists by itself”, and that in human beings differs from the thinking soul (Barthez, 1806, v.1, p.98).

Seemingly, Barthez believed that the life principle exists apart from the body it animates, although there was also room for the possibility that it constituted an innate or acquired

faculty in animal bodies. In any case, it causes and guides all possible chains of spontaneous motions of animal bodies following the primordial laws defined by the Author of nature (Barthez, 1806, v.1, p.117-126).

The evidence adduced by Barthez to support his hypothesis is patently empirical and backed by a whole host of examples listed in the explanatory notes added to the second edition of *Nouveaux éléments* (Barthez, 1806, v.1, p.89-111). His empirical arguments can be grouped in the following categories:

- Functional activity may lack even without any perceptible organic change, i.e., destruction of the vital principle. Reciprocally, this principle may remain in activity, and do so for a long time, even after major affection of the anatomic integrity of organs, including the ones most essential to life;
- In violent and dangerous cases, the vital principle imprints motions to the body unable to effect any mechanical change in the organs; this is a type of motion fully different from the ones characteristic of the ‘natural’ state (what we now call normal). At the same time, these motions are opposite to the ones a free and foreseeing soul ought to imprint on the body to protect it from imminent danger;
- Taking an epigenetic stance, Barthez asserts that the organs are gradually refined during the stage of embryological development, while the organizing action of the vital principle is whole and perfect from the very beginning;
- The same is true of animal instinct: from the moment an animal is born, the vital principle guides it towards the resources that will satisfy its needs.

Since any attempt at extrapolation transgresses the boundaries of experience, Barthez (1806, v.1, p.126-127) concludes in favor of preserving the abstract notion of the vital principle as a simple vital faculty of the human body, endowed with motor and sensitive forces. By the same token, the living functions of the human being must be held as a product of the forces of the vital principle and as ruled by its primordial laws. These laws are, indeed, the object proper to the science of man and might be confirmed by means of their application to analogous facts. To summarize, the primordial laws of the vital principle and its forces can be discovered by means of the observation of vital functions in human beings – and only through it.

Barthez emphasizes that the vital principle produces the countless movements of the body organs needed for the functions of life. In living human beings, these motions must be distinguished from the ones caused by the thinking soul (clear feelings and rational will) (Barthez, 1806, v.1, p.127). Nevertheless, he also admits that once the myriad of positive facts still unknown in his day become known, it might be possible to synthesize the vital principle and the thinking soul into a third and more general principle. In other words, as a result of pure experience it might be possible to reduce two hidden causes or faculties into one (v.1, p.127-128).

Barthez thus argues that the unity of the principle of life may be ascertained based on the intimate connection among all parts of the body, which guides the functions useful or necessary to life, or alternatively on the grounds of the individual character the principle

of life gives to the body of each organism. Both properties had empirical confirmation in the fact that, although the parts of the body are 'worn out' or destroyed over the course of time, at the same time they are continuously repaired, renewed and modified by the principle of life common to them all, as it befits the organism it animates.

### **Who wants to be a vitalist?**

In eighteenth century France, the vitalist doctors were the stronghold against the body-as-machine physiological model, a tradition that extended from René Descartes (1596-1650) to iatromechanics, and whose representatives included Julian Offray de La Mettrie (1709-1751) and Baron d'Holbach (1723-1789). Against a perspective that prescribes universal laws to each and every phenomenon, Montpellier vitalists postulated an absolute demarcation between organized living beings and inert matter.

Moreover, they attributed the singularity of life to a force, principle, or faculty, although its ontological status was unknown. Consequently, life could be understood as the product of the interrelated and harmonious activities of the human body and as if engaged in an ongoing battle against processes that breed disharmony and disintegration, as epitomized by the instance of disease. These scholars observed the endless interactions taking place between the inner disposition of the organism and its external environment, and used them as grounds to understand human individuality and its susceptibility to the countless influences to which it is subjected.

Modern scholars have identified continuities and discontinuities between the formulation held as 'typical' of Montpellier (such as Bordeu's) and Barthez's elaboration. According to Charles T. Wolfe and Motoichi Terada (2008, p.539), both physicians rejected the Stahlian recourse to the soul as an explanatory principle, but elaborated another one associated with the activity of the living human body. For Bordeu, this principle was the outcome of the coordinated organization of organs, an idea that Barthez plainly rejected, since he deemed the vital principle the basis of the system and thus, the cause rather than result of its organization. Elizabeth L. Haigh (1977, p.1-2) offers a similar interpretation when she asserts that the distinguishing trait between Bordeu (and Montpellier tradition) and Barthez is that for the former the principle of animation was immanent in matter, whereas for the latter it was separate from and outside matter.

Other authors, however, persist in asserting dichotomized generalizations, as, e.g., that vitalism was the one factor demarcating Paris and Montpellier medicine in the eighteenth century. Barthez, who is the subject of our case study for this precise reason, exemplifies the risk implicit to such polarizations. In his reasoning, Barthez – an inveterate vitalist (after all, he was a good *montpelliérain*) – relied on concepts and methods that scholars usually associate with Paris (Williams, 2003, chap.2): determinism of the universal laws of nature, use of mathematics to analyze the results of observations and experiments, and rejection of the finalism in nature – all reflecting, as a fact, the influence of the British brand of new science.

Our analysis might shed some light on a curious incident, as yet unexplained but of significant relevance since it involves the first mention of the term vitalist in history. In the preface to his *Principes de physiologie*, published in 1800, Charles-Louis Dumas writes:

Different manners to look at the causes that guide the phenomena of animal economy are related with different hypotheses, all of them exhibiting more or less considerable flaws. All arise from the abusive applications made by philosophers and physicians of the physical and metaphysical sciences into the doctrine of living man. Those who made abuse of the physical sciences comprise the old and large sect of materialists. Those who abused of the metaphysical sciences are a product of the likewise old sect of spiritualists. Between them there is a third class of Physiologists, who do not trace all the phenomena of life back to either matter or to the soul, but rather to an intermediate principle that possesses faculties different from one and the other, and that as a rule arranges and sets in order all the acts of vitality, without being moved by the physical impulses of the material body or enlightened by the moral affections or the intellectual foresight of the thinking principle. These three sects are the origin of all the other ones created by physiologists down to this day. The first one gave birth to the systems of Mechanists and Chemists; the second one gave birth to the one of Animists and Stahlans; the one of Vitalists followed the third one. (Dumas, 1800, p.65-66).

Barthez doubtlessly stood with this third line of thought,<sup>9</sup> and thus it is surprising that in the 1806 edition of *Nouveaux éléments*, he reacted very offended to the ‘accusation’ of being a vitalist and, worse yet, of being the “Head of the Sect” (Barthez, 1806, v.1, p.96-100). We are not interested in ascertaining whether Barthez was ‘right’ or ‘wrong’, or if Dumas had grounds for his ‘accusation’ or not, but on the fact that Barthez’s answer affords us a better understanding of what he had in mind when he introduced a vital principle into physiology.

Barthez (1806, v.1, p.96-100) claims that he linked the physiological phenomena to the action of a vital principle because he was convinced this would help advance the science of man. In his view, this principle was a being of reason, i.e., an abstraction drawn from the phenomena of nature as a function of the characteristics of human knowledge. For this reason, the author hypostatized the vital principle – an abstraction derived from phenomena – as an ‘entity’ with real, albeit artificial existence, and endowed it with a stable and fixed nature. This principle was a type of heuristic mechanism that in practice had helped explain physiology, pathology, and therapeutics. In this regard, Barthez turns to Francis Bacon once again, since for the latter (according to Barthez) abstract notions and the general expressions of causes established by factual sciences may advance knowledge as long as they prove to be useful to classify facts and combine them into enlightening analogies (Barthez, 1806, vol. 1, p.86-100).

Barthez openly contradicts the views laid out in *Nouveaux éléments*, even in its second edition, where the hypostasis is not a being of reason serving as heuristic principle, but is given a well-defined ontological status. It is also remarkable that in the second edition of the book, rather than altering the pertinent passages, Barthez merely added his response to Dumas’ ‘accusation’. Unfortunately, there are no documental sources that allow us to elucidate this contradiction.

Likewise notable is that in order to define the vital principle, Barthez used a process of mathematical reasoning quite similar to the one Hans Driesch (1867-1941) employed two hundred years later to formulate his notion of entelechy as determinant property of the uniqueness of life. This method of reasoning was rigorously developed by Johann P.G. Lejeune-Dirchlet (1805-1859) – on the grounds laid by Joseph Fourier (1768-1830) -as the

modern notion of mathematical function, which was applied to the natural sciences by Heinrich W. Dove (1803-1879), and more specifically to the life sciences by physiologists Emil du-Bois-Reymond (1818-1896), Carl Ludwig (1816-1895), and Hermann von Helmholtz (1821-1894) (Waisse-Priven, 2009).

In Barthez's case, this meant to apply algebraic reasoning (which he calls geometric) and represent the factor (or "hidden quality") determinant of life as the unknown  $x$  of an equation. In this sense, he admits that Dumas' interpretation was correct: "That thing which is found in living beings but is not found in the dead ones we shall call Soul, Arché, Vital Principle, X, Y [or] Z, like the unknown quantities of geometricians. Thus all that remains for us is to determine the value of this unknown, whose assumption facilitates the calculation of the phenomena we know and the ones we seek to know" (Barthez, 1806, p.16, Notes).<sup>10</sup>

### Final considerations

François Duchesneau (1997) argues that one cannot speak of vitalism but of vitalisms, since this theory took myriads of forms as a function of contexts and schools. Duchesneau identifies three eighteenth-century main *loci* for the genesis of this approach: the school of Montpellier, with Barthez elaborating its definitive version; the school of Göttingen, emblemized by Johann F. Blumenbach (1752-1840); and the school of Edinburgh, whose ultimate formulation was achieved by John Hunter (1728-1793). Duchesneau (p.307) defines the particular views of Montpellier as "jointly influenced by the microstructural tradition and certain Stahlia themes, guided by the demands of an approach to practice that claimed to be grounded on the methodological sources of Hippocratism."

However, he did not take into account the elements of mathematics or of English empiricism found in Barthez's thought. On the other hand, there are hints that the strong tradition of Hippocratism can be traced back not to Montpellier but to Paris, home of the renowned sixteenth-century 'Paris Hippocratics' mentioned often by the bulk of eighteenth-century medical authors: Jacques Houllier, Louis Duret, Guillaume de Baillou, and Desidère Jacot (Lonie, 1985).

At the other end of the hermeneutic scale, Wolfe and Terada (2008, p.555) reinterpret the full concept of Montpellier vitalism as if it were merely a variety of "expanded mechanism". As to Barthez's ideas, these authors dismiss the entire edifice he built on the vital principle and rate it a mere abstract entity. Their conclusion is that the French author may be classified, along with Haller, as a vital Newtonianist (p.565), despite Barthez's efforts to differentiate his own view from that of Haller's. The reflections offered by Wolfe and Terada both recall and contradict the previously mentioned warning raised thirty-five years ago by Coleman (1977), to wit, that caution should be exercised with the nomenclature adopted for historical views into the explanation of life and its phenomena.

The term 'vitalism' nonetheless became associated with the names of Bordeu and Barthez, which lets us conclude that at least at its inception, this notion had a medical root, nourished by special ties between Paris and Montpellier.

## NOTES

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<sup>1</sup> In this and other citations of texts from non-English languages, a free translation has been provided.

<sup>2</sup> The literature on vitalism and its history is vast. There are, however, scant systematic reviews of it, like those undertaken by Rey (1997) (published in incomplete form in the annals of the Zaragoza symposium Vitalisms from Haller to the Cell Theory) and by Waisse-Priven (2009, chap.1).

<sup>3</sup> Bordeu (1980) says that he wrote the first edition of La Caze's *Specimen novi medicinae conspectus*, while the following edition was written by Venel. It should be kept in mind, however, that La Caze and Bordeu wrote *Idée de l'homme physique et morale* together (La Caze, Bordeu, 1755).

<sup>4</sup> Cited in Peter Hanns Reill, *Vitalizing Nature in the Enlightenment*, Los Angeles, University of California Press, 2005, p.133. – Translator's note.

<sup>5</sup> Three editions of Barthez's *Nouveaux éléments* were used in this study: the first is dated 1778; the second, corrected and expanded by its author, is dated 1806; and the third was republished in 1858 by Barthez's great-nephew. The citations in this article were sourced from the second edition, since Barthez elucidates there a number of notions while still maintaining the organization he had originally established.

<sup>6</sup> Although it was Pierre-Jean-George Cabanis, in his 1802 *Rapports du physique et moral de l'homme*, who popularized the notions of the physical and moral aspects of the human being, this concept was in fact developed in 1775 by La Caze and Bordeu in *Idée de l'homme physique et moral* (Williams, 1994, p.8).

<sup>7</sup> We should, however, bear in mind that Medicus' ideas had no influence in the German-speaking world (Waisse-Priven, 2009, p.95).

<sup>8</sup> Once again revealing his epistemological tendencies and especially his interest in mathematics and the empirical approach, Barthez is referring to *Physices elementa mathematica experimentis confirmata*, by Willem 's Gravesande.

<sup>9</sup> Dumas does not actually mention Barthez by name, but the allusion was so clear that Barthez immediately felt the blow (Rey, 1997, p.21-22; Williams, 2003, p.276).

<sup>10</sup> Barthez (1806, p.17) also points out that he had made this comparison to algebra in his *Nouvelle mécanique analytique des mouvements de l'homme et des animaux* of 1798: "The names of hidden qualities are useful in simplifying the calculation of phenomena ... These names are employed as the letters of Algebra."

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