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From substantival to functional vitalism and beyond: animas, organisms and attitudes

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RESUMEN

Se hace aquí una distinción entre formas de vitalismo, el 'sustantivo' y el 'funcional' en el siglo XVIII. El vitalismo sustantivo presupone la existencia de una fuerza vital (sustantiva) que desempeña una labor causal en el mundo natural que se estudia científicamente, o que permanece como una entidad extra-causal e inmaterial. El vitalismo funcional tiende a operar *post facto*, desde la existencia de los cuerpos vivos hasta la búsqueda de modelos explicativos que darán cuenta de sus propiedades 'vitales' exclusivas, mejor de lo que los modelos mecanicistas lo pueden hacer. En este artículo analizo figuras representativas de la Escuela de Montpellier (Bordeu, Ménuret, Fouquet) en tanto vitalistas funcionalistas más que sustancialistas, y sugiero algo más sobre la represalia al vitalismo (o vitalismos) en el siglo XX desde Driesch hasta Canguilhem, a saber, que además de las variedades 'sustantiva' y 'funcional', encontramos una tercera clase de vitalismo que llamo 'actitudinal', como su nombre lo indica, afirma el vitalismo como una especie de actitud.

PALABRAS CLAVE
Vitalismo, vitalismo sustantivo, vitalismo funcional, vitalismo actitudinal, Escuela de Montpellier, Driesch, Canguilhem.

ABSTRACT

I distinguish between 'substantival' and 'functional' forms of vitalism in the eighteenth century. Substantival vitalism presupposes the existence of a (substantive) vital force which either plays a causal role in the natural world as studied scientifically, or remains an immaterial, extra-causal entity. Functional vitalism tends to operate 'post facto', from the existence of living bodies to the search for explanatory models that will account for their uniquely 'vital' properties better than fully mechanistic models can. I discuss representative figures of the Montpellier school (Bordeu, Ménuret, Fouquet) as functional rather than substantival vitalists, and suggest an additional point regarding the reprisal of vitalism(s) in the 20th century, from Driesch to Canguilhem: that in addition to the substantival and functional varieties, we encounter a third species of vitalism, which I term 'attitudinal', as it argues for vitalism as a kind of attitude.

KEYWORDS
Vitalism, substantival vitalism, functional vitalism, attitudinal vitalism, Montpellier School, Driesch, Canguilhem.

Vitalism has suffered from its nineteenth-century reinterpretations in terms of 'vital forces' and 'entelechies', notably at the hands of Hans Driesch (Driesch, 1914). It continues to be presented as a very extreme, almost mystical view in current biological and philosophical discourse: in a recent review of theoretical biology (Gilbert & Sarkar), we are told that "in vitalism, living matter is ontologically greater than the sum of its parts because of some life force ("entelechy", "*élan vital*", "*vis essentialis*", etc.) which is added to or infused into the chemical parts"[1]. But when we consider the body of writings produced by the 'Montpellier vitalists', that is, the physicians associated with the Faculty of Medicine at the University of Montpellier in the second half of the eighteenth century (the school considered in doctrinal terms was extended into the early nineteenth century by figures such as Jacques Lordat, but on increasingly dogmatic, non-clinical bases), we find no traces of such metaphysically laden vital forces –or hardly any traces, for Paul-Joseph Barthez flirts with the idea in the first edition of his *Nouveaux éléments de la science de l'homme* (1778; revised 1806) but gives up it subsequently[2]. Hence one can interpret this 'Enlightenment' form of vitalism as *functional* rather than *substantive*, as I have argued recently (Wolfe and Terada, 2008; Wolfe, 2009c): it is more of an attempt to 'model' or 'describe' organic life without reducing it to fully mechanical models or processes, than an overt metaphysics of Life.

[1] Gilbert & Sarkar, 2000, p. 1.

[2] Barthez had initially asserted the existence of an independent vital force, but withdrew this and added a chapter to the second edition of his book entitled "Skeptical considerations on the nature of the vital principle" (Barthez, 1858, III, p. 96 f.; all translations are mine unless otherwise indicated). He warned that one should follow an "invincible skepticism" (p. 32) or a "reasonable Pyrrhonism" (p. 274) when it comes to the vital principle. He only "personified" the vital principle, he explains, for ease of argument (p. 126). What does it mean to investigate the nature of life skeptically? Contrary to what one might expect, it does not mean to approach vital phenomena with a demystifying, deflationary attitude, but rather, that Barthez only wants to attribute properties to the vital principle "that result immediately from experience" (*ibid*.).

But perhaps we should not be too quick to dismiss the metaphysical commitments of vitalism and happily proclaim that it is a more 'modern', egalitarian vision of embodiment free from some of the aporias of the 'dialectic of Enlightenment' (as suggested recently by Elizabeth Williams, or in a quite different way by Peter Hans Reill; see Williams, 2003; Reill, 2005). That is, maybe it is impossible to have a viable concept of vitalism without also having some degree of a metaphysical commitment towards either (a) the uniqueness of living beings within the physical universe (this is the classic version, that of Georg-Ernest Stahl and, differently, of Driesch's 'neo-vitalism') or (b) the idea that the act of understanding what is unique about living beings requires a certain kind of *attitude* (this is the modern version, articulated by Georges Canguilhem, who went so far as to proclaim himself a vitalist, as I'll discuss).

In this paper I want to return to the relation between the Montpelliérain model of vitalism and more metaphysically committed forms of vitalism such as Stahl's 'animism'. I will suggest that the Newtonian-influenced, organizational, functional models of life developed by the Montpellier vitalists open onto an 'attitudinal' vitalism which can survive the various counter-arguments mounted over the course of the twentieth century, from the Vienna Circle onwards. But this attitudinal vitalism may still require (or 'be') a metaphysics.

Substantival versus functional vitalism

We are familiar with vitalism as a strong, ontologically laden commitment to the existence of certain entities or 'forces', over and above the system of causal relations studied and modeled by mechanical or mechanistic science, which itself seeks to express these entities or the relations between them in mathematical terms. This is a common view of the subject, whether it is presented in positive terms, as a kind of commendable backlash against the de-humanizing, alienating trend inaugurated by the

Scientific Revolution, which seeks to 're*vitalize* the world' (and one can hear echoes here of 'reenchantment'[3]) or in negative terms, as a kind of anti-scientific or 'para-scientific' trend which needs to be refuted (an example that comes to mind is Francis Crick's rather confident pronouncement: "To those of you who may be vitalists, I would make this prophecy: what everyone believed yesterday, and you believe today, only cranks will believe tomorrow"[4]). And there is plenty of historical evidence that such a position existed.

But there is something wrong with this vision of things; not because we can adduce *one* counter-example but because an entire *school* does not fit the description: the so-called 'Montpellier vitalists', best known to eighteenth-century scholars because of their relation to Diderot (including his 'postmodern' usage of Bordeu as a fictional character in *D'Alembert's Dream*[5]) and the *Encyclopédie*. And they are the ones for whom the term 'vitalist' was coined!

Who are they? Louis de Lacaze, Jean-Joseph Ménuret de Chambaud, Henri Fouquet, Théophile de Bordeu and perhaps most famously, Paul-Joseph Barthez**.** Barthez expresses a desire not to be equated with other vitalists: "I do not wish to be the Leader of the Sect of the Vitalists."[6] When Barthez speaks of this 'sect' he probably has in mind Charles-Louis Dumas, the au-

[3] Cf. Elizabeth Williams' comment that Montpellier vitalism "entailed consequences markedly at odds with the universalizing discourse of Encyclopedist materialism, with its insistence on the uniformity of nature and the universality of physical laws" (2003, p. 177) –despite my appreciation of Williams' work overall and our past and future shared projects, I disagree with this statement. Further work would have to confront this with Reill's vision of a 'vitalized' Enlightenment in his (2005). The difference is that he thinks the Enlightenment has been misinterpreted precisely in this mechanistic fashion. If we think of figures such as La Mettrie, Buffon and Diderot it seems fair to say that the materialists did not have such strong beliefs in universal laws and most importantly, were 'embodied' theorists. I argue the case for La Mettrie in Wolfe (2009a) and for Diderot in Wolfe (2009b).

[4] Crick, 1966, p. 99.

[5] Dieckmann, 1938; Kaitaro, 1997, ch. 3; Boury, 2003.

[6] Barthez, 1806, p. 98, n. 18.

thor of a vitalist 'synthesis' published in 1800-1803 and, starting in 1807, the Dean of the 'Ecole de Santé' in Montpellier. As Elizabeth Williams has noted, "It was Dumas who, to further his ambitions and to defend Montpellier amid the institutional upheavals brought about by the Revolution, first began referring to 'vitalism', using this neologism to stress the unity and range of Montpellier teaching" (Williams, 2003, p. 276).

The Montpellier medical faculty was one of the oldest in Europe, possibly the oldest, only preceded by the 'school' at Salerno in the 11th and 12th centuries AD (the manuscripts of which were kept from then until now at the monastery at nearby Monte Cassino), which was not however incorporated with license to train students. Documents of incorporation and license to give diplomas date back to 1220-1240. It was also one of the most institutionally flexible (especially in comparison to Paris) both with hiring and firing and with the sheer number of professors of medicine there.

Following the groundbreaking work of Rey (1987, 2000), Duchesneau et al. (1997), and Williams (2003), who have done much to put it on the map, I have tried to argue that the Montpellier vitalist school expresses a 'structural-functional' form of vitalism, with the celebrated image of the *bee-swarm* (found in Maupertuis, Bordeu, Diderot and also Ménuret's *Encyclopédie* article cited below) expressing the structural relation between one life and many lives (Wolfe & Terada, 2008). The bee-swarm is the single most famous image (and conceptual construct!) of 18th-century vitalism. Here is Bordeu's version:

> *How to understand the action of all the parts, their departments, and their periodic motions.*
>
> Might I make use of a comparison which, however rough, may be useful?
>
> I compare the living body, in order to properly assess the particular action of each part, to a swarm of bees which cluster together [*se ramassent en pelotons*], and hang from a tree like a bunch of grapes; I find the image suggested by an ancient author, that one of the lower

organs was an *animal in animali*[7], to be quite helpful. Each part is, so to speak, not quite an animal, but a kind of independent machine [*machine à part*] which contributes [*concourt*] in its way to the general life of the body.

Hence, following the comparison to a bee swarm, it is a whole stuck to a tree branch, by means of the action of many bees which must act in concert to hold on; some others become attached to the initial ones, and so on; all concur [*concourent*] in forming a fairly solid body, yet each one has a particular action, apart from the others; if one of them gives way or acts too vigorously, the entire mass will be disturbed: when they all conspire to stick close, to mutually embrace, in the order of required proportions, they will comprise a whole which shall endure until they disturb one another.

The application is easy: the organs of the body are connected to one another; they each have their district and their action; the relations between these actions, the resulting harmony, is what makes health. If this harmony is disturbed, either because one part relaxes, or another wins out over that which is its usual antagonist, if the actions are reversed, if they no longer follow the natural order, these changes will constitute more or less severe illnesses[8].

Similarly, in the *Encyclopédie* article "Observation", Ménuret mentions the bee-swarm and Bordeu in order to emphasize that life in the body occurs, or is best described as, a "connection of actions" ("liaison d'actions"):

One could, following these authors, compare man to a flock of cranes which fly together, in a particular order, without mutually assisting or depending on one another. The Physicians or Philosophers who have studied and carefully observed man, have noticed this sympathy in all animal movements –this constant and necessary agreement in the interaction of the various parts, however disparate or distant from one another; they have also noticed the disturbance of the whole that results from the sensory disagreement of a single part. A famous physician (M. de Bordeu) and an illustrious physicist (M. de Maupertuis) likewise compared man, from this luminous and

[7] This is apparently a very old euphemism for an organ that, as we might say, 'has a life of its own'…

[8] Bordeu, 1751, § CXXV, in Bordeu, 1818, vol. 1, p. 187 (my translation).

> philosophical point of view, to a swarm of bees which strive together to hang to a tree branch. One can see them pressing and sustaining one another, forming a kind of whole (*une espèce de tout*), in which each living part contributes in its way, by the correspondence and direction of its movements, to sustain this kind of life of the whole body, if we may refer in this way to a mere connection of actions (*liaison d'actions*)[9].

What the 'vitalist' Ménuret is doing here (and in a variety of other places including the important article on the pulse, "Pouls") is actually setting forth a structural, relational, positional approach to what makes living bodies unique.

Not only is the form of vitalism expressed in the above passages far removed from claims about mysterious vital forces; this structural-functional approach to life is also closer to materialism than is often said. Of course this was not necessarily how it was seen: significant figures such as Bichat explicitly identified Barthez's vital principle with Stahl's anima and Van Helmont's archaeus (Rey, 2000, p. 361); Broussais claimed that Barthez "founded medicine on his readings rather than observations"[10]. Bichat also says that the Montpellier physicians "considered science philosophically; they would have made greater [scientific] progress if they had known more anatomy"[11]. 'Vitalism' is a perpetually reinvented polemical term, used so one thinker seeking to articulate a claim for the autonomy of biological entities (like Bichat's famous "la vie est l'ensemble des fonctions qui résistent à la mort") can accuse his predecessor of having been the *real* vitalist.

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[9] Ménuret, s.v. "Observation," *Encyclopédie* XI, pp. 318b-319a. (Further discussion might focus on the variety of organismic metaphors in addition to this one, such as the polyp –more than a metaphor!).

[10] Broussais, *Examen des doctrines médicales* (1821), quoted in Lavabre-Bertrand, 1992, p. 89.

[11] X. Bichat, *Discours sur l'étude de la physiologie*, included in *Recherches physiologiques sur la vie et sur la mort*.

If the Montpellier vitalists were not 'cranks', who *did* believe the sort of thing Crick makes fun of? Georg-Ernest Stahl, a court physician to Duke Johann Ernst of Saxon-Weimar and subsequently, as of 1694, a Professor of Medicine at the University of Halle.

Stahl and Driesch

Stahl bluntly stated a problem about Life in the early 1700s: in all these competing theories of the human body, notably the very successful mechanistic theories, "*Life* was never mentioned nor defined, and I could find no logical definition provided"[12]. To follow Stahl's suggestion, we could say that Life is either discussed but immediately dissipated into the entities and processes which subserve it, or promoted to the extent that vital spirits, vital heat, animation are so co-extensive to the field of investigation that Life again dissipates into the analysis as a whole. Stahl's answer is a multi-tiered, extremely confusing system with metaphysical and physical levels, with specifically medical, biological, chemical and even physical levels; but he is, notoriously, an *animist* because he considers that the body and its organs are literally mere instruments of the soul, a position sometimes revised so that "organs are not, as the name might suggest, mere instruments", but nevertheless, "it is the soul that makes the lungs breathe, the heart beat, the blood circulate, the stomach digest, the liver secrete"[13].

Despite their criticism of mechanistic models for Life –for their inertness, for their inapplicability to living beings, and so forth– the Montpellier vitalists are quite dismissive of this intrusion of a non-medical entity (the soul) into medical explanations. (The missing figure in this story is Haller and what Duchesneau calls his 'special mechanist hypothesis'.) Here is Ménuret:

[12] Stahl, 1706a, in Stahl, 1859, p. 224.
[13] Stahl, 1706b, § xcviii, in Stahl 1859, p. 347.

> Who wouldn't laugh at an animist or Stahlian who would argue that this illness is a gift of Nature or the soul, a kind and farsighted mother who directs all efforts to heal the illness, and even exacerbates them on the pretext of necessity, hoping for benefits that one hopelessly expects from elsewhere? ("Ténesme," *Enc*. XVI, p. 137a).

In a very different way, Bordeu, in his masterpiece the *Recherches anatomiques sur la position et la function des glandes* (1751), when discussing the (very philosophical) problem of whether the secretory process of the glands can be reduced to a type of *sensation* or not, makes a gentler, but equally distancing comment on Stahl's notion of anima. Bordeu answers his question in the affirmative: each gland, each orifice will possess its own unique "taste" so to speak which will enable it to accept or reject various substances. And when he calls it a type of sensation he adds a footnote to the word 'sensation', and emphasizes that both this idea of sensation and Stahl's anima are *metaphors*:

> (*) This is again one of these metaphors which must be allowed us ; those who consider these questions closely know just how difficult it is to explain oneself, when it comes to speaking of the force which so carefully directs a thousand singular motions in the human body and its parts; what terms should we use to describe them? For instance, certain movements in plants and even certain properties of minerals; some 'physicists' [*physiciens*], struck by these movements, have had recourse to particular causes. We will discuss Stahl's hypothesis elsewhere: he claimed that the soul directed everything in the animal body. Whatever the case may be, we can state that all living parts are directed by a preserving or conservative force [*force conservatrice*] which is ever-vigilant; does this force belong, in certain respects, to the essence of a portion of matter, or is it a necessary attribute of its combinations? Once again, here we can only suggest a way of conceiving things, metaphorical expressions, comparisons [...][14].

[14] Bordeu, 1751, § 108, p. 163.

To say that the Stahlian concept of soul is a metaphor (which Stahl does not say!) is essentially to say that the concept has *functional* value (or not) depending on how well it models phenomena –rather than making a claim about what sorts of things exist. If Bordeu were writing sometime after the 1970s he would quite likely have spoken of such images as 'heuristics'.

Stahlian animism versus vitalism as articulated in the Montpellier school are thus two *distinct models* of 'life', of organism, of the approach required to understand living beings[15]. Of course within the Montpellier school there is a spectrum of views, from Sauvages' more Stahlian, animism-friendly to Fouquet or Ménuret's materialistic and in fact mechanism-friendly views. Ménuret after all goes as far as presenting the human body as a structural ensemble of "springs," which taken as a whole "all pursue an overall motion"; a kind of "irritability or sensitivity spreads throughout, animates the springs, excites their motions,"[16] etc.: good mechanistic language! But the point is that we have a *substantival* form of vitalism (also 'ontological') and a *functional* form.

The Stahlian belief in 'anima' is quite similar *qua* form of vitalism, to the position of the embryologist Hans Driesch in the late nineteenth century. Driesch comes out of the school of Wilhelm Roux's *Entwicklungsmechanik* or study of the mechanisms of the developmental process, and (in)famously moved from experimentation with sea urchin eggs, discovering feature of "totipotency," to the metaphysical theory of *entelechies* existing in all living organisms. Faced with the evidence that there was no physical structure we can find in the sea urchin embryo which is responsible for the "regulative" or "equipotential" force, he felt obliged to posit a non-spatial vital force, the entelechy. An en-

[15] Neither of these directly flow into the constitution of 'biology' as a science, in the first years of the nineteenth century (Wolfe forthcoming 2011b); Stahl is much more concerned with chemistry, even if it is in part what we would call organic chemistry, and the montpelliérains are, tautologically, much more concerned with medicine.

[16] Ménuret de Chambaud, art. "Spasme," *Enc.* XV, 435b.

telechy uses the physicochemical forces of the organism, but is not 'of' them. The classic refutation of Drieschian vitalism came with the Vienna Circle (especially Moritz Schlick). The argument relies on the causal closure of the physical (space-time) world, to point out contra Driesch that there cannot be nonspatial causes of organic processes which are themselves necessarily spatial: "if the causes are fully contained in the initial conditions, then there is no reason whatsoever for the assumption of a non-spatial intermediary"[17]. What we will see with Canguilhem (via Claude Bernard, who himself was interested by Diderot's late writings on physiology[18]) is that one can share the rejection of mysterious vital forces without necessarily adopting such a reductionist approach to the biological.

Vitalism as an attitude: Canguilhem

There is doubtless no need to introduce the philosopher and historian of the life sciences Georges Canguilhem here. But he is more famous for his work on the normal and the pathological, and his relation to Foucault, than as a theorist or practitioner of vitalism. Canguilhem often refers to vitalism in his work, going as far as describing himself as one in the Foreword to 1955 book on the development of the notion of reflex action: "Il nous importe peu d'être ou tenu pour vitaliste…" and presenting the book itself as a "defense of vitalist biology"[19]. Even if he is wearing the hat of the historian of medicine, looking at the construction of a concept (say, the cell theory), Canguilhem the philosopher asks highly 'motivated' questions of science, in a manner which undoubtedly owes a great deal to Bachelard's historical epistemology. The history of science has to study possible conceptual developments rather than just invalidate the past (the error of

[17] Schlick, 1953, p. 536.
[18] Barral, 1900.
[19] Canguilhem, 1955, Avant-Propos, p. 1.

'presentism'). What this entails for vitalism is that it has a specifically *philosophical* place, whether it is scientifically 'validated' or 'refuted', and apart from its status as a scientific 'construction'.

In this sense, Canguilhem suggests, *vitalism is not like geocentrism or phlogiston* (to pick two classic cases of scientific 'errors')*: it is not refutable in quite the same way*[20]. Vitalism is generally considered to have been 'refuted' twice. First, according to a celebrated scientific tale, with Wöhler's synthesis of urea in 1828, which showed that organic substances can be produced out of inorganic compounds, thus invalidating the claim that the chemistry of the living body is categorically distinct from that of inanimate bodies. Second, a century later, this time because of physics, in early twentieth-century Vienna Circle arguments against Hans Driesch and Bergson, in the name of the causal closure of the space-time world[21]. The undead character of vitalism shows up in the first case, with Wöhler's synthesis of urea, when people start to describe the purported refutation as a "chemical legend" (including because the synthesis was actually only performed by Berthelot later on), and when chemists like Berzelius continue to speak of vital forces afterwards[22]; in the second case, substantival vitalism is refuted, not what we might call *explanatory* or *heuristic* vitalism –which are derivative forms of what I've earlier called *functional* vitalism.

So not only is vitalism a unique kind of historical object; much more metaphysically, Canguilhem suggests that it is *Life*

[20] Canguilhem, 1965, p. 84.

[21] See Frank, 1998 [1932], especially chapter 4; Wolsky & Wolsky, 1992.

[22] McKie, 1954. See also Schiller, 1967 (on Berzelius and von Liebig); Ramberg, 2000. For the classic, 'heroic' view of Wöhler see Jacques (1950). Raymond Ruyer conversely asserts the link between chemistry and vitalism, declaring that it was "lack of chemical knowledge" that made seventeenth-century Cartesian biologists be mechanists (Ruyer, 1958, p. 51). If we look back at Stahl, he insists on the importance of chemistry for conceptualizing what is unique in organic beings (their characteristic *mixtio* rather than mere aggregates) but, somewhat dialectically, he adds that once that reaches the level of a *theoria medica vera* , then one can dispense with the chemical analysis of bodies, like the ladder we leave behind after having climbed up it (not his image!). Stahl, 1706a in Stahl, 1859, vol. 2, p. 224.

itself which dictates a certain kind of attitude on the part of the inquirer. There is something about Life that places the knower in a special relation to it. Indeed Canguilhem frequently makes an overtly metaphysical, ahistorical claim that the living animal is necessarily a knower, so that conversely, the nature of Life itself forces the knower to approach it in a certain way.

The idea is that vitalism is a fundamental existential *attitude* –not just one historical episode amongst others:

> Vitalism expresses a permanent requirement or demand [*exigence*] of life in living beings, the self-identity of life which is immanent in living beings. This explains why mechanistic biologists and rationalist philosophers criticize vitalism for being nebulous and vague. It is normal, if vitalism is primarily a 'demand', that it is difficult to formulate it in a series of determinations[23].

Vitalism expresses a permanent "requirement" or "demand" of life as present in living beings; the self-identity of Life immanent within living beings. What exactly is this "requirement"? Something teleological? Purposive? Vitalism in Canguilhem's thought may be a heuristic concept: cf word *exigence* (he uses it a lot): vitalism is "more a requirement than a method, an ethics rather than a theory"[24]. Now, it may be a requirement rather than a theory, but it is, I suggest, a big requirement: that Life itself, symmetrically to the inquirer's attitude, is understood as self-positing, spontaneous activity:

> It is certain that the vitalists view generation as the basic biological phenomenon, for the images it generates and the problems it raises impact all other biological phenomena. A vitalist, I would suggest, is someone who is led to reflect on the nature of life more because

[23] Canguilhem, "Aspects du vitalisme", in Canguilhem, 1965, p. 86.

[24] *Ibid.*, p. 88. Although the image of the egg sounds more like Driesch (except it's also in Harvey and the Oxford physiologists) than like Bordeu or Ménuret.

> of the contemplation of an egg than because of s/he has handled a hoist or a bellows[25].

Notice how the above passage moves imperceptibly from the historical (a description of "the vitalists") to the assertive ("a vitalist is…"), and even to the prescriptive (in his best-known writings on the 'normal and the pathological').

Vitalism then has two dimensions in Canguilhem's thought: on the one hand it is *heuristic*, a claim that living phenomena need to be approached in a certain way in order to be understood; on the other hand, it also possesses a more *ontological* dimension. Consider his example: vitalism is not like (the theory of) phlogiston or geocentrism. Faced with this 'fact' that vitalism is not like phlogiston, there are two possible responses:

> it's not like phlogiston because it's *true* and thus one's ontology needs to include it (like Driesch's entelechies);
>
> it's not like phlogiston because it has this *heuristic value*, or explanatory power.

In fact, it's not entirely clear where Canguilhem falls in this divide. However, his comments on vitalism as an "orientation" (what I have called an attitude) tend towards the latter interpretation. Indeed, it is clear that both *philosophically* and as a *historian* of science (to reintroduce this naïve distinction) he is careful to distinguish his claims from the more inflated ones of substantival vitalism. (I return to the question of whether vitalism is or is not like phlogiston or geocentrism in closing, 'bad science'.)

Canguilhem is careful to distinguish strong metaphysical vitalism à la Driesch from the views (and practices) of the eighteenth-century vitalists. This is the theme of 'biological Newtonianism' (referring to the popularity of Newtonian analogies amongst the vitalists in the eighteenth century, among others):

[25] *Ibid*.

> Eighteenth-century vitalists are […] not impenitent metaphysicians but rather prudent positivists, which is to say, in that period, Newtonians. Vitalism is first of all the rejection of all metaphysical theories of the essence of life. This why most of the vitalists referred to Newton as the model of a scientist concerned with observation and experiment. […] Vitalism ultimately means the recognition of life as an original set or realm [*ordre*] of phenomena, and thus the recognition of the specificity of biological knowledge[26].

A medical vitalist in the eighteenth century is not a substantival, metaphysical vitalist of the late nineteenth or early twentieth century. The importance of the Newtonian motif is that, by means of an analogy with Newton's method in positing an unknown entity (such as gravity) from which he can then derive a series of mathematical equations with real tangible value, the vitalists can say: let me posit this unknown called 'life' and derive from it various other phenomena, from digestion to sensation, to the functioning of the glands: these suddenly appear as interconnected, goal-oriented processes which do not exist either in an inanimate mechanism –or a corpse. But significantly the vitalist will make no ontological claims about the nature of this vital principle, or even attempt to make causal connections between such a principle and observable phenomena; Barthez: "I am as indifferent as could be regarding *Ontology* considered as the science of entities"[27].

What's tricky about Canguilhem is that he *both* rejects metaphysical, substantival vitalism (he uses Spinozist language to deny that in reality there can be a 'kingdom within a kingdom'), *and* asserts the "originality of biological phenomena," we might say their autonomy, as a "over the totality of experience." What looks at first glance like metaphysical holism might instead be an 'attitudinal' conception, that is, a *point of view* on experience. Indeed,

[26] Canguilhem, 1955, p. 113.
[27] Barthez, 1806), p. 96, note 17.

even when Canguilhem discusses the uniqueness of organisms he never denies that their 'holistic' quality is enabled by various regulatory processes or mechanisms that subserve the whole and preserve its integrity (much like Cannon's notion of homeostasis, itself explicitly indebted at least theoretically to Bernard's notion of *milieu intérieur*).

In a very real sense one cannot distinguish between a historical claim and a philosophical claim in Canguilhem's 'history of vitalism' or 'vitalism'. They cohere around the claim that vitalism is an "attitude" ("une orientation de la pensée biologique") rather than strictly an episode ("une étape de sa démarche")[28].

Nevertheless, even if we can agree that vitalism is unlike geocentrism or phlogiston in the way Canguilhem suggested, and we can see the possible interest in discussing vitalism as an 'attitude', we should also recognize that Canguilhem's revisionist project to put the life sciences at center stage in the history of science overall (which had traditionally been dominated by the hard sciences) is bound up with strong ontological commitments, and a certain conceptual vagueness to boot. Namely, his project must amount to a claim regarding the specificity of its object, but it is not easy to make out exactly which claim he wants to make:

> Life itself as an object is ontologically unique, including in its anomalousness; living entities are meaningful and meaning-producing entities and thus have to be understood as such (this covers both the existential and the Goldsteinian aspects of his claim).

Canguilhem's vagueness appears, e.g., when he denies that vitalism is a metaphysics, and then adds immediately afterwards that it is "the recognition of the originality of the fact of life [*le fait vital*]"[29].

[28] "Aspects du vitalisme," in Canguilhem, 1965, p. 84.
[29] Canguilhem, "Le normal et le pathologique," in Canguilhem, 1965, p. 156.

Conclusion

I have tried to illustrate the existence of three forms of vitalism: substantival, functional and attitudinal. It is typically the first form which is targeted in critiques of vitalism (such as that dating back to the Vienna Circle); it is represented here by Stahl and Driesch. The second form matches up fairly well with what philosophers of science in contemporary times would call 'heuristic' concepts of mechanism or organism, as explanatory structures or models. Historically, this 'functional' kind of vitalism is associated with the Montpellier school and with the attempt to articulate a relation between parts and whole in which the parts are construed as little *lives* (recall the image of the bee-swarm, a Life composed of many little lives). The third, attitudinal (projectivist) form is chiefly articulated by Georges Canguilhem (influenced by Kurt Goldstein).

A few questions then arise:

- What is the posterity of this 'Montpellier form' of vitalism? Here we face an immediate difficulty inherent in tying Enlightenment natural philosophy or medicine to developments beginning in the nineteenth century (which the history of medicine and related disciplines could view as 'positive science', as in the work of Claude Bernard). Yet in a different sense closer to intellectual history, it is worth emphasizing that the words 'vitalism' and 'biology' are coined at about the same time, and in that sense an investigation of the model or concept of organic life (organism, animal economy, and so on) characteristic of Montpellier vitalism could shed some light on the series of conceptual shifts that take place in the generation before the emergence of 'biology' as a science – not least since several of its founders, such as Lamarck and Treviranus, explicitly state they are responding to the need for a science specific to the conditions of Life. Just because an episode such as Montpellier vitalism does not get to be part of the

history of medicine the way John Snow's discovery of cholera does, does not mean we have to go along with Francis Crick's pronouncement quoted above, or with similar scientific views that vitalism is a kind of verbiage quickly dispelled by molecularized life science. It is sometimes suggested that vitalism is primarily a vision developed by physicians, not biologists, which is why it is not so surprising that it has vanished from the philosophy of biology. This specifically medical dimension can be conveyed in the basic claim that all living beings die and get sick – hence there is a necessary axiological element (that is, an element of values or norms).

- There is also the related issue of how closely we can link, or correlate, 'ontological shifts' with the emergence of a science. In this particular case, there is the very broad question 'does vitalism impact the history of science' and the slightly more specific one 'does vitalism lead to a science such as biology?' One version of this is to emphasize how, faced with mechanism and animism at opposite extremes, vitalism avoided "the worst of both systems" and developed the best parts, notably their explanatory richness and a kind of synthetic experimental protocol. Roger French suggests that out of this "What emerged was the idea of biological properties, that is, qualities (principally of sensation and motion) that were unique to living systems and not to be derived from a mechanical model." I am not sure this actually happened in the way he presents it. For one thing, the figure who much more closely matches this story is Albrecht von Haller, whose relation to vitalism is complicated to say the least (also for reasons like the rivalry between him and Bordeu). Haller famously combines a rigorous micro-mechanistic vision of the phenomena of life with a careful set of arguments for the uniqueness of features such as irritability and sensibility which are specific to living, organic beings. The most negative answer to the question 'does vitalism impact the science of life (or even lead to a science such as

biology)?' would be, like Crick's attitude, the idea that vitalism is a paradigm case of 'bad science' to be ontologically eliminated. Rather than trying to decide this outright, I suggest that we can reconceptualize the issue charitably by viewing it as an alternative between vitalism as a permanent impulse for life science; or as a permanent folk belief ('folk biology'); neither of which are ontologically eliminable.

In none of the cases we have seen (Stahl, the Montpellier vitalists, Canguilhem, etc.) does it appear to me to be straightforwardly the case that a vitalist 'theory' or 'claim' or 'metaphor' gets naturalized or formalized or quantified and turned into mainstream science – with the exceptions of Blumenbach et al. (which have no medical connection). However, there is a distinctive 'form of life' that emerges in the reflections of the Montpellier School and the various related projects, whether antecedent (Glisson, Willis, Stahl), contemporary and congenial (Diderot), contemporary and competitive (Haller), or posterior (Cabanis, Bichat, Bernard). In that sense I hope to have called attention to a different 'face' of vitalism than the one usually seen.

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