The Return of Vitalism:
Canguilhem and French Biophilosophy in the 1960s

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Abstract

The eminent French biologist and historian of biology, François Jacob, once notoriously declared "On n'interroge plus la vie dans les laboratoires"[1]: laboratory research no longer inquires into the notion of 'Life'. Nowadays, as David Hull puts it, "both scientists and philosophers take ontological reduction for granted… Organisms are 'nothing but' atoms, and that is that."[2] In the mid-twentieth century, from the immediate post-war period to the late 1960s, French philosophers of science such as Georges Canguilhem, Raymond Ruyer and Gilbert Simondon returned to Jacob's statement with an odd kind of pathos: they were determined to reverse course. Not by imposing a different kind of research program in laboratories, but by an unusual combination of historical and philosophical inquiry into the foundations of the life sciences (particularly medicine, physiology and the cluster of activities that were termed 'biology' in the early 1800s). Even in as straightforwardly scholarly a work as *La formation du concept de réflexe aux XVIIe et XVIIIe siècles* (1955), Canguilhem speaks oddly of "defending vitalist biology," and declares that Life cannot be grasped by logic (or at least, "la vie déconcerte la logique"). Was all this historical and philosophical work merely a reassertion of 'mysterian', magical vitalism? In order to answer this question we need to achieve some perspective on Canguilhem's 'vitalism', notably with respect to its philosophical influences such as Kurt Goldstein.

Keywords: vitalism, Canguilhem, biophilosophy, Goldstein, metaphysics

Tout ce que j'ai écrit était vitaliste, du moins je l'espère . . .
(Gilles Deleuze)[3]

French biophilosophy[4] in the 1950s-1960s means at least three names – Georges Canguilhem, Raymond Ruyer, and Gilbert Simondon – along with someone who presented himself strictly as a scholar, a historian of science, but who, as it turns out, can also be considered as belonging to this group: Jacques Roger (Ruyer's early works are contemporary with Canguilhem's, in the 1940s; Simondon and Roger are active in the

1960s and, in Roger's case, until the 1990s). A full-scale comparative study of these figures would demonstrate, among other things, how they combined the history of science with philosophy to move the 'life sciences' to center stage, and how this 'biophilosophy' differed from what we now know as the philosophy of biology.[5] The present essay will restrict itself to the figure of Canguilhem.

I first heard of, and started using, Canguilhem *as a scholar* – as an authority on the history of the life sciences and their conceptual underpinnings, in modern thought. Actually, that is not quite correct. I first heard of Canguilhem as a *theorist*, someone who had been Michel Foucault's teacher. And I tried to read *The Normal and the Pathological* and found it less exciting and rewarding than I expected, or than Foucault said. At a later point, having read a lot of Nietzsche like many philosophy undergraduates, it started to make more sense to me why Foucault could say, in the preface to this work but especially in an interview, that Canguilhem was a Nietzschean, much to the puzzlement of the poor journalist interviewing him. Some years later, doing graduate work on early modern philosophy and the life sciences and trying to understand the tensions between mechanistic and organismic models of life in this period, a period in which even pure metaphysics can lead straight away to the life sciences and specifically to the most anti-mechanistic, enthusiastically epigenetic, parts of the life sciences,[6] Canguilhem reemerged in my readings, as a major 'authority', albeit one who happily quoted Aristotle, Kant and Hegel (not Nietzsche) in the midst of an analysis of Claude Bernard, Charles Darwin, Georg-Ernest Stahl, or Thomas Willis. I was surprised to hear, then, recently from a friend and mentor who had been involved in a workshop on Canguilhem that year at the Max-Planck Institute for the History of Science in Berlin,[7] that Canguilhem was "filled with mistakes," or at least exaggerations and non-textually supported claims. In other words, what you would expect of a *philosopher*! But that's all right: we read Hegel on Aristotle, Russell on Leibniz, or Jonathan Bennett on Spinoza despite all their mistakes or perhaps even because of them. That much established, what will be my goal here?

If we look at Canguilhem's unusual status as a thinker, along with some other contemporaries of his in France in the post-war decades, Roger, Ruyer and Simondon, we notice a shared focus on vitalism. More specifically, we notice that these thinkers blend the historical and the normative when dealing with vitalistic themes in the conceptual foundations of the life sciences (namely, the as-yet-unnamed 'biology', natural history, medicine, physiology, etc.). This appears quite bluntly in Canguilhem, who presents

himself at least to all but close readers as a scholar, with a *thèse d'État* on the origins of reflex physiology – yet declares quite bluntly that he *is* a vitalist.

I am not the first person to note that there is an unusual combination of the historical and the normative, or the scholarly and the speculative, in these thinkers. In a little-known but interesting book entitled *La notion d'organisation dans l'histoire de la biologie* (1978), a book which is marred by frequent polemical outbursts (which, however, also contribute to rendering it interesting), Joseph Schiller targeted Jacques Roger, Foucault, and Canguilhem as anti-Cartesians who attempt to revise the history of science in a 'vitalistic' way so as to deemphasize the key role of Descartes in particular and the mechanistic 'paradigm' in general. Schiller opposes 'good' history of science, which he understands as being in agreement with what the scientists say, and thereby has to be mechanistic, from Descartes to Bernard and beyond, to 'bad' history of science, which obeys certain philosophical imperatives, in this case vitalistic ones. We are more familiar with authors in science studies opposing 'hard' mechanistic science to relativistic socio-cultural discourses; here the opposition is between mechanism and vitalism.

As it turns out, Canguilhem quite explicitly reflects on the dual nature of vitalism as both a historical object and a conceptual stance, thus mirroring Schiller's critique, but also becoming a moving – because self-aware – target. Thus my main focus in what follows will be this dual nature of vitalism, as presented 'by' Canguilhem but also 'in' Canguilhem, that is, both according to his analyses and according to his own performance as a philosopher. Hopefully this will both shed some light on a particular intellectual constellation in postwar France and disturb some of the philosophical complacency on the topic of vitalism which is characteristic both of Anglophone philosophy (which views it as something negative) and German philosophy (which views it as something positive).[8]

1.

Canguilhem often refers to vitalism in his work, going as far as describing himself as one in the Foreword to his book on the development of the notion of reflex: "Il nous importe peu d'être ou tenu pour vitaliste…" and presenting the book itself as a "defense of vitalist biology."[9] But some years earlier, he had devoted one article exclusively to the topic, "Aspects du vitalisme" (originally a series of lectures given at the Collège Philosophique in Paris in 1946-1947).[10] In this piece, Canguilhem asserts from the outset that when the philosopher inquires into biological life, she has little to expect or gain from

"a biology fascinated by the prestige of the physicochemical sciences, reduced to the role of a satellite of these sciences" (p. 83). In other words, the philosopher in this position is almost inexorably led to a vitalist *positionnement*. The type of questions she will have for biological science entails that the latter not be conceived of in reductionist terms, although Canguilhem doesn't explicitly say if a purely physicochemical perspective on biological entities is flawed ontologically, or just methodologically. Nevertheless, this is a loaded, rather a prioristic conception of biological science, actually quite reminiscent of the holism of Kurt Goldstein, who Canguilhem openly credits as a major influence. I shall say a bit more about Canguilhem and Goldstein later on (surprisingly few scholars have addressed their relation),[11] but for now just want to emphasize his unusual way of presenting the relationship of philosophy to biology (after all, sixty years later, with the emergence of a major sub-discipline called 'philosophy of biology', as presented notably in the journal *Biology and Philosophy*, we might say that nothing at all has to make the philosopher adopt this position with regard to biology!).

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 probably owes a great deal to Bachelard's historical epistemology: "A philosophy which looks to science for the clarification of concepts cannot disregard the construction of science"; "Truth is not constituted in a history of truth but in a history of science, in the experience of science"; "the pursuit of truth is the effect of a choice which does not exclude its opposite."[12] The history of science has to study possible conceptual developments rather than just invalidate the past (the error of '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, as Canguilhem suggests, *vitalism is not like geocentrism or phlogiston: it is not refutable in quite the same way*.[13] It's clear that Canguilhem does not agree with Francis Crick's rather confident pronouncement, sounding very much like someone who feels he has the whole scientific community behind him: "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."[14] Canguilhem's response to this would be that if vitalism is a permanent bugbear for mainstream mechanistic science, then it has a somewhat 'undead' character. And this is fair enough, if we consider the two major

refutations of vitalism – the two moments at which an actual case is built against it, rather than hand-waving and or dismissing it as being in bad taste.

Vitalism is generally considered to have been 'refuted' twice. First, according to a celebrated scientific tale, with Friedrich Wöhler's synthesis of urea in 1828, which showed that organic substances can be produced out of inorganic compounds, thus rendering the claim that the chemistry of the living body is categorically distinct from that of inanimate bodies, invalid. 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.[15] 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[16]; in the second case, substantival vitalism is refuted, not what we might call *explanatory* or *heuristic* vitalism.

So not only is vitalism a unique kind of historical object; much more metaphysically, it is *Life 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 echoes of the first sentence of Aristotle's *Metaphysics*, "All men by nature desire to know," are probably deliberate here). One of Canguilhem's most difficult and ambitious pieces, one of the few places where he deliberately indulges in high metaphysics, the 1966 essay "Le concept et la vie," begins with a long meditation on Aristotle, and declares that the thinker is interested in Life insofar as it is "the form and potential of the living."[17] Or, at the beginning of the reflex book, a comment which recalls Hegel's *Science of Logic*: "Life disconcerts logic" ("la vie déconcerte la logique," p. 1)! Foucault repeats much the same thing in his fine essay on Canguilhem: "To form concepts is a way of living, not of killing life."[18]

This means that science itself is derivative of a more fundamental 'vital' activity. Mechanism and vitalism are two poles between which our thinking oscillates, in relation to an object called Life which transcends this opposition. Indeed, in "Aspects du vitalisme" we find explicit binary oppositions, e.g., "Mechanism and Vitalism are at odds on the issue of structures and functions" (p. 85); but Life itself is said to transcend these oppositions:

"The opposition between Mechanism and Vitalism, or Preformationism and Epigenesis, is transcended by life itself, extending itself [*se prolongeant*] as a theory of life" (*ibid*.). Of course, if vitalism and mechanism are simply the two poles of the activity of Life and its interpretation (*son intelligence*, one would say in French), why should vitalism be any better than mechanism? (In his acute, short analysis of "Canguilhem and the autonomy of biology,"[19] Stephen Gaukroger targets precisely this kind of opposition for getting in the way of genuine history of science.[20]) I will not attempt to answer this question now, as I mainly want to emphasize that Canguilhem is operating with an extremely robust, one might even say overdetermined concept of Life.

The idea that vitalism is a fundamental existential attitude rather than simply a scientific theory is very Goldsteinian. That is, Canguilhem takes over Goldstein's chief holistic or organismic idea – it is the organism as a totality, not a cluster of functions or organs, that acts and reacts, as a unified approach to its environment and its challenges[21] – and strips it of some of its more overtly metaphysical trappings; yet the holistic dimension, the emphasis on the 'whole person', reappears now and then, with surprisingly existentialist and humanist overtones, when Canguilhem opposes Life to technology and the various forms of the "mechanization of life," and speaks of human biology and medicine as belonging to an "anthropology"; by extension, "medical vitalism" is the expression of an "instinctive suspicion toward the power of technology over life."[22] That Canguilhem, who was admired and described as an "incalculable influence" by Althusser,[23] not to mention Foucault, was also a humanist (in a Comtean vein, mediated by Alain), is yet another facet of this Sphinx-like intellectual.

Canguilhem strips the Goldsteinian concept of organism of some of its metaphysical trappings in at least two ways: a more 'Darwinian' way, which, while preserving an existential emphasis on vitality, is less totality-oriented, as Jean Gayon helpfully notes, and more directed towards the challenges of the environment; a more 'Nietzschean' way, which emphasizes a kind of blind vitality without teleology. The latter dimension provides more of a link to Foucault, who somehow manages to connect contextualist history of science to Nietzschean anti-foundationalism (concepts and the activity of concept formation are not foundational but are rather derivative from something more fundamental, Life itself). Yet we should notice a significant difference between Canguilhem and Foucault, if not at the 'basement level' of their Nietzscheanism, then at least on the specific topic of the status of biological entities and theorizing. Namely, as is well known, Foucault declared –

controversially – in *Les mots et les choses* that 'Life' did not exist before the emergence of biology as a science bearing that name, in the nineteenth century.[24] In contrast, Canguilhem, despite being a discontinuist in the history of science, holds that something called 'Life' determines the emergence of various theoretical enterprises, and exerts a kind of traction on the knower / theorist / scientist.[25]

We can summarize Canguilhem's views as presented so far, as two major claims:

— conceptual clusters such as Mechanism or Vitalism, doctrines such as preformation or epigenesis are themselves just aspects of something more fundamental, Life itself, and its ramifications which we can term 'theories of Life';

— vitalism (like mechanism) is something like a fundamental existential attitude.

The second claim is a fair candidate for being Canguilhem's 'big claim' as a philosopher; the first claim, despite its metaphysical character, is intimately bound up with his project as a historian of science or *épistémologue*. I would like to flesh this out briefly, using as my main example Canguilhem's *thèse d'État, La formation du concept de réflexe aux XVII*^{e} *et XVIII*^{e} *siècles*, before returning to the properly philosophical claim about vitalism, which is my chief focus here, since the purpose of this essay is not to evaluate Canguilhem's historical claims at length.

2.

What does Canguilhem's *La formation du concept de réflexe* tell us about his practice as a historian? First, that his vision of the history of science, its discontinuities, and its way of privileging the life sciences over the traditionally predominant mathematizable sciences, is very much a *conflict model*. Notably, the argument of this book is that Willis rather than Descartes deserves to be considered, not just the founder of physiological inquiry into this problem, but as a kind of 'father' of modern physiology, particularly neurophysiology (to get a sense of what Canguilhem was reacting against, consider, amongst many similar statements, this one from J.H. Woodger: "Descartes' physiology of the nervous system has served as the foundation for all that has since been done in the interpretation of that system, and the modern view has *in principle* departed but little from the lead that Descartes gave it"[26]). Just as in the paper on vitalism, in which he spoke of vitalism as the true source of reflex theory, rather than mechanism, he is stating an explicit opposition: it's a clear case of history of science understood as a series of either/ors. The same opposition appears in a later essay on the notion of 'environment' in biological thought, in which Canguilhem

opposes the restrictive, Cartesian view of animal motion, this time as presented in behaviorism, to a richer understanding of motion and perception presented in Gestalt theory and von Uexküll's ethology.[27]

Canguilhem deliberately takes the opposite stand from the mainstream scientific view, stated notably by Pavlov (and then Sherrington), that in the emergence of scientific study of reflex phenomena, "In the main we base ourselves on Descartes' concept of the reflex. Of course this is a genuinely scientific concept, since the phenomenon implied by it can be strictly determined."[28] In nineteenth-century physiology and subsequently, reflex phenomena were considered in fully mechanistic fashion to be basic components of animal motion. But in Canguilhem's view, Sherrington's insistence on treating the reflex as an elementary form of the integrative power of the *nervous system* is a step back in the right direction taken by Willis (and Robert Whytt) – vitalism![29] This is because the problem of how to explain animal motion tends to be overshadowed by the explanation of muscular motion, while it in fact involves nervous activity as well.

His revisionist claim, then, is that we have misinterpreted the history of this area of science, and misjudged its actors, because we are 'blinded' by the prejudice that successful science is *mechanistic* science. Now, in strictly historical terms it is possible to challenge Canguilhem's revisionist view, or at least temper it, by showing that he gets Descartes wrong, either because Descartes *does actually have* more of a sophisticated reflex theory than Canguilhem claims, or because Canguilhem gets the Cartesian project wrong.

Objections of the former sort are raised, e.g. by Geneviève Rodis-Lewis, who quotes passages from Descartes that Canguilhem does not mention, describing Pavlovian conditioning of a dog who is whipped while a violin is playing, and gradually acquires the reflex of fleeing at the sound of a violin.[30] Broader interpretive objections include those of Stephen Gaukroger, who observes that Cartesian mechanistic physiology doesn't have to be seen as denying or disinterested in the existence of goal-directed processes (it is in fact replete with functional language, e.g. when discussing the circulation of blood and the motion of heart in the *Discourse on Method*). Descartes' physiology just runs up against some walls when it comes to generation – so that he rejects any teleological explanations in fœtal development. It's more of a *reductionist* program than an *eliminativist* program: "Descartes' point is not that bodies actually are machines (an eliminativist view) but rather that the structure and behaviour of bodies are to be explained in the same way that we explain the structure and behaviour of machines (a reductionist view)."[31] This is meant to

counter Canguilhem, who in Gaukroger's view interprets Descartes as an (unsuccessful) eliminativist. The revival of vitalism in nineteenth-century biology arose, in Gaukroger's view, less in response to the 'problem of life' (which corresponds to the more 'Aristotelian' thrust in Canguilhem, as I've termed it: that which stresses the relation between the knower and Life itself) than because of the issue of goal-directed processes.

But recall that vitalism is not just a historical episode here. In Canguilhem's eyes, as we have seen, it is also a *fundamental existential attitude*:

> 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.[32]

3.

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? Foucault, seeking to give a charitable interpretation of the place of vitalism in Canguilhem's thought as what we might call a heuristic concept, quotes another passage from this article in which Canguilhem uses the word *exigence* again (he uses it 7 times in all): vitalism is "more a requirement than a method, an ethics rather than a theory."[33] 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 of the contemplation of an egg than because of s/he has handled a hoist or a bellows.[34]

Notice how the above passage moves imperceptibly from the historical (a description of "the vitalists") to the assertive ("a vitalist is…"), and even, as we see in the following passages, to the prescriptive:

> An organism is an entirely exceptional mode of being, because there is no real difference, properly speaking, between its existence and the rule or norm of its existence. From the time an organism exists, is alive, that organism is 'possible', i.e., it fulfills the ideal of an organism; the norm or rule of its being [*existence*] is given by its existence itself.[35]

Or:

> Man is only truly healthy when he is capable of multiple norms, when he is more than normal. The measure of health is a certain capacity to overcome organic crises in order to establish a new physiological order, different from the initial order. In all seriousness, health is the ability [*le luxe*] to fall ill and then get over it. On the contrary, illness is the reduction of the power to overcome other illnesses. [36]

So the philosopher of biology has to understand Life in a certain way in order not to miss its essential spontaneity; historically, thinkers known as vitalists have had what he calls "this vitalist confidence in the spontaneity of life."[37] But the strongest claim of all is that Life itself is a positing of norms. The recurring Nietzschean point in Canguilhem's writing, that what it is to be alive rather than a crystal or mineral is to be capable of error, or conversely, that life could be the result of an error,[38] must be understood in support of his more general claim that norms are derived from vital activity itself. A vital error is something like an anomaly, which is why the history of biological thought always includes the problem of monsters: "If life has any meaning, we have to admit the possibility of a loss of meaning, of aberrations and boss shots or misdeals [*maldonne*]."[39] Hence, as Canguilhem often says, there are no monstrous crystals, nor monstrous machines. Earlier I distinguished between Darwinian and Nietzschean aspects of Canguilhem's vitalism, but here they merge, with the anti-foundationalist, anti-teleological claim that Life is both *capable* of error and possibly *derived* from an error – a claim which may be seen as mitigating his vitalism.

Nevertheless, Canguilhem is a vitalist, both as a philosopher and as a historian. Granted, he does not appear to be a substantival vitalist (a theorist of extra-causal vital forces), nor does he believe that higher sentient mammals constitute an 'empire within an empire', as we shall see below. The latter position makes him something like a naturalist. Yet the odd metaphysics that is inseparable from his position makes his contribution very different from a straightforward 'patient-centred' philosophy of medicine.[40] This metaphysics is both a kind of strong vitalism with Aristotelian and Hegelian resonances, and what I termed a kind of existentialism – and both of these make Canguilhem a very different thinker from what Foucault presents him as, in his homage, "La vie: l'expérience et la science." Namely, instead of being the pure of heart anti-phenomenologist, the Résistance fighter who fought without a grounding concept of a subject, self or ego, Canguilhem is very much a Goldsteinian, like Merleau-Ponty: someone who loads the concept of organism, or living beings, with enough determinations to radically distinguish them from the rest of the natural world.[41]

To summarize these two dimensions of Canguilhem's thought, one could say that on the one hand his vitalism is *heuristic*, a claim that living phenomena need to be approached in a certain way in order to be understood; but on the other hand, it possesses a more *ontological*, Aristotelian dimension. One of Canguilhem's students, Dominique Lecourt, confuses this heuristic dimension with ontological vitalism: "The assertion of . . . 'vitalism' as an intellectual requirement which aims to acknowledge the originality of Life, entirely retains its significance today, when the combination of a type of biochemical materialism and a type of mathematical formalism tend to deny this originality of Life, the better to neuronalize thought."[42] In contrast, in his earlier work on epistemology,[43] Lecourt had judged Canguilhem's vitalist tendencies severely – they were the part of his thought that the Marxist interpreter should not keep.

Consider the example Canguilhem had given in "Aspects du vitalisme": vitalism is not like (the theory of) phlogiston or geocentrism. Now, 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;

— 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. (Notice that if vitalism is a refutable scientific theory, then it should have to meet the basic Popperian requirement that a scientific theory has to be refutable – granting the pertinence of this vision of science, of course. When Canguilhem says vitalism isn't like geocentrism or phlogiston then how can it be a scientific theory?[44])

Philosophically, he refers with a hint of irony to Hegel's imprudent leap away from Kant – from a deliberately regulative, projective vision of organism to a 'rational metaphysics' or, in Canguilhem's terms, an explicit identification of concept and life: "Hegel accepted what Kant refused to accept. In the *Phenomenology of Spirit* as well as in the Jena *Real-philosophie*. . . the Concept and Life are identified with each other."[45] And yet, at times Canguilhem appears to side with Aristotle (whom he enthusiastically describes as the first to understand concept and life together) and Hegel rather than with Kant and Goldstein 'read in one way'. For Goldstein, too, is double-sided on this matter – his work

on the concept of organism has both a constructivist side, like a Kantian regulative ideal or a Dennettian intentional stance and a realist side, filled with references to Goethe and *Naturphilosophie* (the organism is by essence "historical," in time rather than in space, it is pure activity or creativity, etc.) which fits with the Aristotle-and-Hegel side in Canguilhem.[46] Canguilhem fits somewhere in between Goldstein and Darwin, or, to say it differently, between the metaphysics of Aristotle and Hegel and the anti-metaphysics of Nietzsche. Think of his typically revealing-yet-mysterious pronouncement "Je suis un nietzschéen sans carte."[47]

Scientifically, or in terms of the history of science, Canguilhem is similarly careful to distinguish strong metaphysical vitalism from the views (and practices) of the eighteenth-century vitalists, in contradistinction to people like Driesch. This is the theme of 'biological Newtonianism':

> 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.[48]

A medical vitalist in the eighteenth century is not a substantival, metaphysical vitalist of the late nineteenth or early twentieth century. Indeed, Canguilhem goes as far as to say that eighteenth-century vitalists are anti-metaphysicians opposed to the strong metaphysics of animism or mechanism.[49] As Karen Detlefsen puts it in a different context, ontological reduction does not have to affect the 'scientific' pertinence of the distinction between the living and the non-living.[50]

Lastly, there is a long passage in "Aspects du vitalisme," one of the most difficult ones in this essay, in which Canguilhem rejects Drieschian vitalism (or mysterianism as we would call it today) more clearly than anywhere else:

> In sum, the classical vitalist grants that living beings belong to a physical environment, yet asserts that they are an exception to physical laws. This is the inexcusable philosophical mistake, in my view. *There can be no kingdom within a kingdom* [*empire dans un empire*], or else there is no kingdom at all. There can only be one philosophy of empire, that which rejects division and imperialism. . . . One cannot defend the originality of biological phenomena and by extension, of biology, by delimiting a zone of indeterminacy, dissidence or heresy within an overall physicochemical environment of motion and inertia. *If we are to affirm the originality of the biological, it must be as a reign over the totality of experience, not over little islands of experience*. Ultimately, classical vitalism is (paradoxically) too

> modest, in its reluctance to universalize its conception of experience (p. 95, emphasis mine).

'Classical' vitalism as described here is what is commonly termed substantival vitalism. And Canguilhem's diagnosis of an "inexcusable philosophical mistake" is clear enough. But what should we make then of his defense of the "originality of the biology," i.e. the autonomy of biology, as a "reign 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, 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 "maintain its integrity."[51]

4.

Unlike the "classical vitalist," Canguilhem insists, using Spinoza's phrase, that we are *not* a kingdom within a kingdom, an *imperium in imperio*! That is, the laws of the physical world apply in full to all living beings, humans included, without exceptions. So all problems would appear to be solved. Yet this statement creates new problems! Granted, to the standard question, how can one be a vitalist and reject any *imperium in imperio*?, we can answer on Canguilhem's behalf that one can be a constructivist or heuristic vitalist; but what do we do then with all the talk of 'Life itself', *le vivant*? Similarly, if we grant in addition that the 'Aristotelian' dimension in his vitalism – the stress on how Life itself creates a certain attitude on the part of the knower – is not to be confused with mysterianism, we are left with the rather opaque invocation in the above quotation of "experience." It doesn't seem to fit with the rest of his views … except if we recall that he is, after all, a 'Goldsteinian'.[52] If we think back to what I called Canguilhem's humanism, it does have a dualistic quality to it, even if is a 'functional' or 'double aspect' dualism, of the knower and the known,[53] the knower / philosopher / scientist and Life itself.

Indeed, in a very real sense one cannot distinguish between a historical claim and a philosophical claim in Canguilhem's 'history of vitalism' or 'vitalism'. To put it in the form of a slogan (in fact a phrase which concludes the long article "Le concept et la vie"):

> Contemporary biology, read in a certain way, is somehow a philosophy of life.[54]

Or, to take a particular case, recall his attitude towards the Cartesian notion of animal-machines, as noted by Gaukroger: Canguilhem views them on the one hand as inadequate representations of organisms, but on the other hand, as the ruse of reason (!), as a form of

skill, referring back to the original term μηχανή. As such, he considers that mechanistic representations are subsumable once again under the category of Life and its productions, i.e., as modalities of the organic world.[55] Indeed, even though Canguilhem discusses the rise of developmental biology at least through Hans Spemann, he never addresses the fact that the mechanisms of generation can ultimately be seen as just that: mechanisms; or that Descartes carefully avoided making specific claims about them, as he couldn't see them, which does not mean that Cartesian biology qua mechanistic biology is condemned to any sort of failure. Similarly, he shares with the other main figures of post-war 'biophilosophy' a hostility to reductionist explanations in developmental biology – but in his case, without claiming that there is a *substantive* difference between the world of living organisms and the mechanistically specifiable world of inanimate matter (this would be the position he calls 'classical vitalism' above); or between organismic biology and molecular biology.[56]

Of course, dialectically enough, Canguilhem's blurring of the divide between being a historian-*épistémologue* focusing on the life sciences, and being a 'metaphysical vitalist' can again be seen in a more positive light, i.e., in more manageable, 'attitudinal' terms: one can argue that (a) the Aristotelian dimension, (b) that of experience, and (c) the existential dimension all cohere with his claim that vitalism is an "attitude" ("une orientation de la pensée biologique") rather than strictly an episode ("une étape de sa démarche").[57] And if, as present-day historians of science, we point out that he gives a partisan reading of biological thought intended to delegitimize Cartesian mechanism in favor of biological epigenesis – and vitalism, then why shouldn't we also acknowledge that present-day biological thought is, if not fully reversing course, at least arguing in a strongly 'epigenetic' direction and privileging developmental biology over genetics (or at least an essentialist vision of genetic information)?[58]

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*]."[59]

Conclusion

I initially wanted to end with the reminder that the intellectual episode I've presented should be viewed as an interesting 'heuristic' model of vitalism which is much more sensible than is usually acknowledged in Anglophone philosophy of science and related disciplines.[60] That is, it's not substantival vitalism, and if it is 'metaphysical' it is such in a much more manageable sense. For one thing, Canguilhem's vitalism may differ from the Aristotelian-inspired 'organicism' of Marjorie Grene in that it denies that there are any fundamental norms other than Life itself, which is a source of norms rather than being governed by them. Human values are no more real than anything else in the space-time world – this is Canguilhem's more 'Spinozist' side: "The term 'real', in all rigor, can only be applied to the universe itself, the universal environment [*milieu universel*] of elements and motions as recognized by science"; "the environment of man's values isn't any more, taken in itself, than the specific environment of the woodlouse or the gray mouse."[61] Further, in a more descriptive vein, Canguilhem can quote Claude Bernard to the effect that there is nothing wrong in principle with applying physicochemical laws to vital phenomena, but the result will be to subsume the latter under the former, reiterating the laws of physics and chemistry rather than discovering the specific laws of physiology.[62] In this sense, Canguilhem both does and does not fit into the category known as 'biophilosophy' in France in the first decades after the end of the Second World War (of which Raymond Ruyer and Gilbert Simondon are notable figures); his historico-philosophical project, despite its ambiguities, appears more flexible and open-ended than these biologically motivated metaphysics.

But is this understanding of vitalism that interesting? In fact, pleas for explanatory autonomy in biology, or the need for special theoretical tools to deal with complexity, are a dime a dozen today. We need look no further than a representative figure in American philosophy of science, William Bechtel, to find discussions of how "organization" is a key

explanatory challenge for mechanistic, reductionist modeling, with reference to Claude Bernard, among others.[63] So here, instead, is a different conclusion: looking at Canguilhem the 'biophilosopher', the scholar of vitalism who is also a vitalist, one could say that interesting and indeed legitimate results in intellectual and scientific history (notably, totally revising our picture of the emergence of the life sciences, and the philosophical ramifications of that emergence) can be arrived at *for the wrong reasons!* – or at least, for philosophical reasons that we might not want to take on board. Sometimes, good money does follow bad. Conversely, present-day historians and philosophers of science who invoke Canguilhem in support of their constructivist epistemological inquiries[64] might learn from the above analysis that Canguilhem is rather more metaphysically committed than they would like him to be. Whether this is necessarily a negative feature of his thought is something I leave open to discussion.

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http://mechanism.ucsd.edu/~bill/research/bechtel.biologicalmechanismsorganization1.pdf
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Endnotes

[1] Jacob (1970), p. 320. See Canguilhem's own discussion of Jacob in Canguilhem (1971a).

[2] Hull (1981), p. 282.

[3] Deleuze (1990), p. 196.

[4] This is a term that was popular in the decades after World War II in French philosophy of science. No less a resource than Wikipedia informs us that 'biophilosophy' is not guilty of the reductionist excesses of analytically oriented 'philosophy of biology'. I'll ignore these kinds of valuative definitions as my aim is to understand what kind of claim was being made by Canguilhem in this context, with particular reference to the notion of vitalism.

[5] On the emergence of philosophy of biology as a discipline in contrast to 'biophilosophy' see Gayon (1998a).

[6] I say 'epigenetic' with reference to Diderot's article "Spinosistes" in the *Encyclopédie*: there, Diderot explicitly connects what he calls 'modern Spinozists' to the then brand-new biological theory of epigenesis.

[7] The proceedings of which have appeared as C. Borck, V. Hess, H. Schmidgen, eds. (2005).

[8] It is possible that – Schiller's book aside – histories of medical thought, of physiology, or biology overall tend to have a faintly 'vitalistic' bias: a work which is more or less considered as a standard resource in English, T.S. Hall's *A General History of Physiology* (Chicago: University of Chicago Press, 2 vols., 1975; the earlier edition was entitled *Ideas of Life and Matter. Studies in the History of General Physiology*) presents itself as a defence of 'emergentism'.

[9] Canguilhem (1955), Avant-Propos, p. 1 (all translations mine unless otherwise indicated).

[10] "Aspects du vitalisme," in Canguilhem (1965).

[11] Gayon (1998b), pp. 309-310, Macherey (ms.) and Métraux (2005) make some useful observations; Métraux also reproduces a letter from Canguilhem to Goldstein. Gayon notes several further references to Goldstein in Canguilhem: *La Connaissance de la vie*, pp. 11–13, 24, 146; *Études d'Histoire et de philosophie des sciences*, p. 347; *Idéologie et rationalité dans l'histoire des sciences de la vie*, p. 138.

[12] Respectively Canguilhem (1947/1965), p. 84, and Canguilhem (1971b).

[13] Canguilhem (1947/1965), p. 84.

[14] Crick (1966), p. 99.

[15] See Frank (1998 [1932]), especially chapter 4; Wolsky and Wolsky (1992). **(In addition: Schummer, 'The notion of nature in chemistry', 2003.)**

[16] McKie (1954). See also Schiller (1967) (on Berzelius and von Liebig); Brooke (1968); Ramberg (2000). For the classic, 'heroic' view of Wöhler see Jacques (1950). Ruyer, not exactly an impartial observer, 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).

[17] Canguilhem (1966), in Canguilhem (1968b), p. 335.

[18] Foucault (1985), translation (1998); Foucault (1980), p. 60.

[19] Gaukroger (1999). **And Wolfe, "Le mécanique face au vivant," forthcoming.**

[20] It should suffice to mention the figure of Albrecht von Haller to see that the opposition between mechanism and vitalism is neither a historical constant, nor a useful distinction with which to understand the emergence of physiology. Haller "explained many phenomena by the vital 'properties' of sensibility and irritability yet, unlike Montpellier theorists, held that these properties

resided in specific anatomical structures of nerve and muscle" (Williams [1994], p. 86; cf. Duchesneau [1982], pp. 141-170).

[21] Canguilhem (1972), p. 49. In addition to Goldstein, one should also mention the key background figure of Bergson. But then the list of his predecessors starts to grow: one should include Comte, who was the object of Canguilhem's M.A. thesis and who he always took very seriously; Comte who, after all, analyzed the relationship between philosophy and biology in the 40th lecture of his *Cours de philosophie positive* and stated that his goal was to "defend the originality of this area, continuously exposed to the exaggerated *empiètements* of inorganic philosophy, which tends to turn it into a mere annex of its scientific province. . . . Constantly thrown back and forth between Metaphysics which strives to hold it back, and physics which tends to absorb it," biology needs to conquer its autonomy (Comte, as quoted in Rey [2000a], p. 8). For my purposes Canguilhem is chiefly a disciple of Goldstein, and of Nietzsche.

[22] Canguilhem (1947) in Canguilhem (1965), pp. 86, 99; vitalism is "life seeking to put mechanism back in its place, in life" (*ibid.*); the same idea appears decades later, in his entry "Vie" for the *Encyclopedia Universalis*. The comment on "anthropology" can be found in "Le normal et le pathologique," in Canguilhem (1965), p. 169.

[23] Preface to Althusser (1969), p. 256.

[24] Foucault (1966), (1970). For an excellent discussion of the shifting meanings of 'biology' and its predecessors, 'physiology' and 'natural history', along with an analysis of the relation between 'philosophy' and these terms, see Gayon (1998a); on 'Life' and natural history in the Enlightenment see Wolfe (2009).

[25] Arguably this more 'metaphysical' view in Canguilhem's post-war essays as collected in *La connaissance et la vie* (Canguilhem [1965]) gives way to a more historicist view, e.g. in the article "Vie" written for the *Encyclopedia Universalis* in 1968 (Canguilhem [1968a]).

[26] Woodger (1929, 1967), p. 48. Robert Martensen, in his recent study *The Brain Takes Shape* (Martensen [2004]), repeats Canguilhem's revisionist valorization of Willis contra Descartes, without mentioning Canguilhem's work.

[27] Canguilhem, "Le vivant et son milieu," in Canguilhem (1965), p. 144. For more on how von Uexküll was read by mid-twentieth century Continental philosophers (but not Canguilhem), see Buchanan (2008).

[28] Pavlov (1955), p. 178 (cf. pp. 174-175), quoted in Schiller (1978), p. 17.

[29] In addition to Sherrington, Canguilhem names Goldstein, von Weizsäcker, Merleau-Ponty, Ruyer and Henri Ey in support of this anti-mechanistic view; compare Vygotski's discussion of the issue in Vygotski (1925/1997).

[30] Descartes to Mersenne, March 18th, AT I, 134, quoted in Rodis-Lewis (1990), p. 165, n. 34.

[31] Gaukroger (1999).

[32] Canguilhem (1947), in Canguilhem (1965), p. 86.

[33] *Ibid*., p. 88.

[34] *Ibid*.

[35] Canguilhem (2002), pp. 106-107.

[36] "Le normal et le pathologique," in Canguilhem (1965), p. 167.

[37] Canguilhem (1947), in Canguilhem (1965), p. 89.

[38] See for instance Nietzsche's aphorism in *The Gay Science*: "*Life is not an argument*. — We have made ourselves a world in which we can live – by assuming the existence of bodies, lines, planes,

causes and effects, motion and rest, form and content: without such articles of faith no one today would agree to live. But that doesn't mean their existence has been demonstrated. Life is not an argument: among the conditions of life there might be error" (Nietzsche [1988], III, § 121, my translation).

[39] Canguilhem (1966), in Canguilhem (1968b), p. 364.

[40] In this respect I disagree with the more uncritical analysis proposed in Han (2005). A more convincing way of connecting the aspect of Canguilhem's thought discussed here with his better-known theory of the normal and the pathological is suggested in Trnka (2003), with which I agree in large part.

[41] I am obviously not questioning Canguilhem's admirable conduct during the war, and his lack of vanity in this regard, but rather Foucault's claim that this practice went hand in hand with an anti-humanist philosophical position.

[42] Lecourt (1993), p. 269.

[43] Lecourt (1972); translation (1975).

[44] Thanks to Pascal Nouvel for pointing this out.

[45] Canguilhem (1966), in Canguilhem (1968b), p. 345.

[46] On this distinction between the 'regulative' or 'constructivist' approach to the concept of organism and the ontologically 'realist' approach, see Wolfe (2004), (2006).

[47] **Cited by Michel Fichant in "Georges Canguilhem et l'Idée de la philosophie," in Balibar, Lecourt *et al.*, eds., *Georges Canguilhem. Philosophe, historien des sciences*.** Thanks to Henning Schmidgen for this reference.

[48] Canguilhem (1955), p. 113.

[49] Canguilhem, "Le normal et le pathologique," in Canguilhem (1965), p. 156.

[50] Detlefsen (2007). An excellent historical example of someone who rejects mechanistic explanations of generation *at the scientific level* without being a metaphysical antimechanist, is Claude Perrault; see Perrault (1680-1688).

[51] Canguilhem (2002), p. 110.

[52] Maybe Foucault's self-criticism regarding his excessive reliance on a concept of experience in his early work amounts to a move away from this more phenomenological part of this tradition.

[53] I deliberately borrow the title of a well-known book by Marjorie Grene (Grene [1974a]), who is probably the preeminent American disciple of the kinds of thinkers who influenced Canguilhem, chiefly Goldstein; ironically, Grene is also at the forefront of a kind of neo-Aristotelianism in the philosophy of biology which Canguilhem seems to be free from (see Grene [1974b]). Indeed, Canguilhem's vitalism may differ from the Aristotelian-inspired 'organicism' of Grene in that it denies that there are any fundamental norms other than Life itself, which is a source of norms rather than being governed by them. For a more sympathetic reading of Grene, see Sloan (2007).

[54] Canguilhem (1966), in Canguilhem (1968b), p. 364.

[55] Schmidgen (2005) nicely suggests that Canguilhem is thus closer to a biologistic, anti-computational position (such as Ruyer's) than to a philosophy of technology (such as Simondon's).

[56] One need only contrast Canguilhem's viewpoint with that of his contemporary, the 'biophilosopher' Raymond Ruyer, who insists that the scientific choice is between "a generalized 'theory of organism'" and the theory of "a 'generalized molecule'" (Ruyer [1952], p. 166). Ruyer goes so far as to regret that such explanations do away with Drieschian entelechies by reducing embryo development to physicochemical laws (Ruyer [1946], p. 80), and finds even Bergson too

mechanistic and Cartesian, in the sense that he had an excessively spatial understanding of the body (*ibid*., p. 30)!

[57] Canguilhem (1947) in Canguilhem (1965), p. 84.

[58] A good deal of ground-breaking work has appeared in recent years on this topic, from that of Susan Oyama and Scott Gilbert in a more biologically oriented vein, to that of Evelyn Fox Keller and Lenny Moss, in a more philosophical vein. For a useful presentation of these ideas, see Robert (2004).

[59] Canguilhem, "Le normal et le pathologique," in Canguilhem (1965), p. 156.

[60] The history and philosophy of the life sciences in Germany is a special case, as it frequently involves efforts to rehabilitate or reassert the value of *Naturphilosophie*.

[61] Canguilhem, "Le vivant et son milieu," in Canguilhem (1965), p. 154.

[62] Canguilhem, "L'expérimentation en biologie animale," in Canguilhem (1965), p. 32, n. 32.

[63] See, aside from Bechtel's important work on cell biology, his recent paper with the explicitly Bernardian title "Biological mechanisms: Organized to maintain autonomy" (Bechtel [2007]). It's unclear if Bechtel has ever read Canguilhem.

[64] I have in mind the recent volume on Canguilhem edited by Cornelius Borck, Volker Hess and Henning Schmidgen (Borck *et al*., 2005) and Rheinberger (2005).