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Vitalism

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Vitalism is typically presented as the belief – scientific, metaphysical, poetic and other – in the uniqueness of Life, presented as a 'substance', 'force', or 'principle'. As such it is a frequently criticized theory, often in caricatural forms, where a model of the living being (notably of organism), embryo development, or forms of non-mechanical causality is called 'vitalist' – a label applied to various theories which have little in common with each other, with entirely different empirical bases and/or metaphysical commitments. In fact, the historical and conceptual significance of the category of vitalism for biological thought lies in its perpetual challenge, either to 'reductionism' (although this is a loose category without strict historical demarcation), or at least to the pretensions of a reductionist biology. As Georges Canguilhem suggested, vitalism is less a specific empirical claim (easily refuted or refutable) than a kind of heuristic project (or challenge, in a different vocabulary) concerning the nature of living entities.

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1. What is vitalism?

What is vitalism? Who is, or was, a vitalist? I have tried several times in other places to answer this deceptively simple question (most recently Wolfe 2020). While the term is often used loosely to apply to all kinds of theories of 'animate matter' or 'ensouled matter', or even the philosophies of Alfred North Whitehead or Gilles Deleuze (Osborne 2016), I suggest that the term be restricted to theories in which the difference between 'life' and 'non-life' – between living matter and non-living matter, living bodies and dead bodies, bodies and machines, biology and physics, etc. – is crucial, howsoever this difference is spelled out. Of course, writers in different disciplines will use the term in different ways, but in this essay (and, I would suggest, in historically and philosophically informed work on conceptual issues in the life sciences more generally), 'vitalism' will mean the above, rather than claims about 'mind' or 'agency' existing in all of Nature. Now, it so happens that this stipulative definition applies quite well to the doctrines of the Montpellier School, that is, the school associated with the Montpellier Faculty of Medicine, especially in the mid-to late eighteenth century – which is where the term 'vitalism' is first used (in fact as a self-description), notably by Charles-Louis Dumas, Dean of the Montpellier Faculty in the 1790s (Rey 2000; Williams 2003; Wolfe 2019). Vitalism in this context is strongly tied to the study of the systemic functions of the organism, with a notable emphasis on functions such as organic sensibility, i.e. sensitivity.

In a recent review of the status of theoretical biology, we are told that "[i]n 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" (Gilbert/ Sarkar 2000: 1). Defined in this way, 'vitalism' is also usually opposed to 'materialism', in the sense that people imagine a doctrine of vital forces, especially when these are understood as somehow 'above and beyond' the physico-causal realm. That is 'vitalism' is characterized as ontologically opposite to a doctrine which reduces all properties of any entities to the basic properties of matter. Implicit in this understanding of materialism (which can be challenged, and I have argued for this elsewhere: Wolfe 2017a) is a conflation between mechanism and materialism, given that these basic properties of matter are in fact those defended in the classic mechanistic ontologies like René Descartes'.

While this is a correct description of ideas dating back to the late nineteenth century, particularly the

vitalism put forth by the embryologist Hans Driesch, it is incorrect about vitalism in general. Basing himself on his experiments on sea urchin embryos, Driesch (1905) developed a metaphysical theory of what he called 'entelechies', entities which somehow existed apart from the causal, space-time world studied by natural science. He came out of the school of Wilhelm Roux's *Entwicklungsmechanik* or study of the mechanisms of ontogenesis, and (in)famously moved from experimentation with sea urchin eggs, discovering the physical 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 entelechy, according to Driesch, uses the physicochemical forces of the organism, but is not 'of' them.

In contrast, 18th-century vitalism – notably as defined and practiced by physicians such as Louis de la Caze, Théophile de Bordeu, Jean-Joseph Ménuret de Chambaud and Paul-Joseph Barthez at the Montpellier Faculty of Medicine where the word 'vitalism' is first used to describe a medical doctrine – is *not* a metaphysical claim about a mysterious life-force (Cimino/Duchesneau 1997; Rey 2000; Williams 2003). It is a more practical, heuristically oriented medical and philosophical program that uses functional, Newtonian-inspired models of organism to discuss temporal, dynamic and sometimes subjective dimensions of embodiment – disease, crisis, pulse, nosology … (Wolfe 2008; 2017c; McLaughlin/Demarest 2020). In addition, Montpellier vitalism is 'materialism-friendly', denying the existence of the soul other than as an organic entity, and believing that higher functions are explainable in terms of arrangements of living matter. This can also be seen from the vitalist Bordeu's inclusion as a (positively presented) character in the philosophical novel *D'Alembert's Dream* (1769) by the materialist philosopher Denis Diderot. Some readings of Stahl and even Kant allow for such a materialism-friendly reading in terms of what we might call a doctrine of 'organic mechanism' but these do not seem to belong easily to a specifically *vitalist* narrative (on Kant and Stahl) (see Pecere 2021).

A separate question is whether we can speak of vitalism in all epochs – coeval with the history of philosophy? the history of medicine? of science *tout court*? – given that scholars sometimes refer to Aristotle's vitalism, or the 'cosmic' vitalism of the Renaissance, including that of figures such as Van Helmont (Demarest 2021). I discuss this in more detail elsewhere (Wolfe 2020; 2021; forthcoming b) but will simply indicate here that it makes most sense to analyze and describe this concept in a post-Cartesian context in which thinkers (physicians, naturalists, philosophers etc.) are not seeking to investigate the life of the cosmos or the world-soul (Chang 2011; Wilberding 2021) but rather the nature of the organic body, its capacities, its unity, and its organization. Vitalism, or rather forms of vitalism in the post-Cartesian context can disagree about these issues but will share this rather more restricted framework, which does not at all imply any specific ontological commitments like mechanism. But additionally, as I will discuss, there are different possible distinctions and differentiations to make: Chang (2011) speaks of 'cosmic' versus 'immanent' vitalism; and I have distinguished between 'substantival' and 'functional' vitalism (Wolfe 2011); here (as in Wolfe 2021) I reflect more on the question of whether or not vitalism is, can or should be a metaphysics, including with regard to Canguilhem's specifically philosophical defence of vitalism, as I discuss below.

2. Vitalism with and without metaphysics

The vitalists of the Montpellier School (Wolfe 2017b; 2019; 2021) are not *neo-vitalists* like Hans Driesch in the late nineteenth and early twentieth centuries: they do not look for a metaphysical foundation for the inquiry into organic nature, and specifically do not 'multiply entities' by suggesting that there are, e.g. "entelechies", that is, non-physical causes of physical events. Thinking back to Gilbert and Sarkar's definition, which contrasts what they call vitalism with organicism, i.e., a more metaphysical and a less metaphysical version of the theory of living beings, it seems in fact that the Montpellier vitalists are "organicists" on this definition (in earlier work (Wolfe 2011), which I have revisited critically (Wolfe 2021), I suggested a distinction between 'substantival' and 'functional' vitalism, where the former referred indeed to metaphysical vitalism while the latter referred to thinkers interested in describing the functional properties of living beings). They are not interested in some extraphysical source of life, or even in a kind of emergentist view which insists that life is irreducible to the properties of matter;

rather, they seek to account for the nature of organic wholes – their unity, their structural complexity, their interconnectedness – as is characteristic of organicistic concepts of living beings usually associated with later authors like Immanuel Kant and Georges Cuvier (see Cheung 2006).

A term frequently used in the 17th and 18th centuries to describe this nature of organic wholes was the "circle of action." Thus La Caze describes the specific "wholeness" of organisms as a circle of action, constantly in change but also causally interlinked, "in such a way that […] at every moment effects become causes and causes in turn become effects"; he adds that given this degree of "interconnection", one cannot "locate a beginning or an end […] in the animal economy" (La Caze 1755: 68 f.). As in early twentieth-century organicism, these theories could place more or less emphasis on the *unity* of the organism. While some of the figures of the mid-Enlightenment period, who collaborated also on Diderot and D'Alembert's *Encyclopédie* (Bordeu and Ménuret de Chambaud notably) emphasized structural complexity, a later Montpellier figure, Jean Charles Marguerite Guillaume de Grimaud, better known for his theory of the "two lives" and work on digestion (Williams 2008), places more emphasis on the unity itself, writing: "The basis [*raison*] of the individuality of a living being could only be in the unity of the principle that animates it: […] the various parts that compose it can only be united, integrated and cohere with respect to certain goals according to shared motions, inasmuch as they are all dependent on one entity which, in its simplicity, can exist both in all its parts and lead them to perform functions that relate to no specific part, but to the whole formed by their assemblage" (Grimaud 1824: 326, 409).

Critics of vitalism and of holism in biology more generally single out such notions of unity as themselves ungrounded, or metaphysical postulates (see the discussion of Ernest Nagel contra Ernst Cassirer in Chirimuuta forthcoming), but it is a fact that such notions are also embedded in influential (and mainstream) scientific work; as Chirimuuta has noted, Charles Scott Sherrington's (1906) classic work on the nervous system makes exactly such a claim early on: "A simple reflex is probably a purely abstract conception, because all parts of the nervous system are connected together and no part of it is probably ever capable of reaction without affecting and being affected by various other parts, and it is a system certainly never absolutely at rest" (ibid.: 7 f.).

For now I simply want to stress that the notion of organic or organismic unity articulated in Enlightenment vitalism is in large part a non-metaphysical notion, derived from physiological and medical observations and intended to serve such projects. Accordingly, when Ménuret or Bordeu criticize Georg Ernst Stahl's notion of the anima, their main objection is that the notion of an all-controlling soul regulating bodily processes is of no use in medicine (Wolfe 2011; 2019). This is important because Stahl's animism has often been confused with vitalism (on this issue see Demarest et al. 2021). This raises the question of what metaphysics is at stake in these debates, or which conception thereof. I can only note the following in response (for more on this topic see Wolfe 2021): first, that from at least the 18th century onwards, and very frequently in 19th-century medical writings, vitalists were accused in precisely those of terms of being "too meta-physical", not experimental enough, overly committed to theoretical entities, etc. (see e.g. Bouillaud 1836), second, that vitalists were faced with the following situation, as it were. Namely, if vitalists were reacting to the mechanistic reduction of all material properties including those of the living body to some version of a 'size, shape and motion' ontology, but did not wish to support an animist ontology in which Life meant Soul, they were faced with some version of this choice: they either had to explain vitality (self-preservation, self-maintenance or regulation) in terms of a special force or principle that was not present in matter per se, or they could explain it as a particular kind of organization.

It is important to distinguish between this earlier, medically based vitalism of the Montpellier School and a later, more metaphysically oriented vitalism, even if the latter begins with embryological (developmentalist) work. A major figure who seeks to be the point of inter-section between experimental embryological research and theoretical vitalism is Driesch (1905), with his notion of entelechies, a doctrine which he referred to as vitalism. The classic refutation of Drieschian vitalism came with the Vienna Circle. The argument relies on a basic fact of physics, the causal closure of the physical (space-time) world, to point out contra Driesch that there cannot be non-spatial causes of organic processes which are themselves necessarily spatial or, thus, immaterial forces powering material processes.

For Driesch the entelechy is a life-force affected by various physical constraints in the cell. Amongst several critics of this view, Moritz Schlick seized the opportunity to say: if all the various sub-systems are required as active constraints on this force, but this force is not accessible to us, we can just factor it out! For a non-physical entity to profitably interact with a physical entity, or to bring about a physical process, it must at some point itself become physical. Driesch cannot reconcile the action of his non-physical entelechies with the basic (methodological or ontological) determinism of Newtonian physics. A non-spatial force such as the entelechy vanishes, in this case; "if the causes are fully contained in the initial conditions, then there is no reason whatsoever for the assumption of a non-spatial intermediary" (Schlick [1925] 1953: 536). Even if Driesch undoubtedly did not intend to support even a biological version of substance dualism, it remains the case that he seems to have (re)introduced a variant of dualism; as I will discuss in closing, most scientifically robust versions of vitalism seek instead to rebut dualism, e.g. as a claim about 'soul' or 'vital force' powering the body – although in some cases focusing, like Driesch did in the early 20th century, on developmental issues, like Johann Friedrich Blumenbach's work at the turn of the 19th century, the focus on 'forces' is not at all abandoned, but rather integrated into a non-metaphysical framework – as such, a story like that told here, with more of a focus on 19th-century German biology, would look different. (I thank an anonymous reviewer for their remarks on Emil du Bois-Reymond and Hermann Lotze, for instance, in this regard.)

To return to Driesch's vitalism of entelechies: the criticism of his view, then, is that biological laws can and will be reduced to physical laws. Note that this is not quite the same thing as insisting that everything that happens in this world is by necessity a physical event or process, as in Quine's statement that "nothing happens in this world, not the flutter of an eyelid, not the flicker of a thought, without some redistribution of microphysical states" (Quine 1981: 98) – but this is not the place for further discussion of physicalism. But it is important to take into account that this refutation of an overly metaphysical vitalism relies on a full-fledged reductionist view of the nature of the biological – and that it doesn't matter that Driesch insisted that his doctrine did not contradict the second law of thermodynamics. And again: In a manner similar to Nagel's critique in the 1950s (see Chen 2019), some early psychologists (e.g., Köhler 1925; Meyer 1926) and system-theorists (e.g., Bertalanffy 1928; 1932), who regard organicism as a 'third way' between vitalism and materialism, as well as some early British emergentists (see McLaughlin 2003), and, recently, Gilbert and Sarkar (2000), insist on a difference between vitalism and organicism. However, that difference is mitigated by the analysis of vitalism proposed in the present essay, notably because the vitalism targeted by those scholars is less naturalistic (indeed perhaps anti-naturalistic), less materialism-friendly and as such much less akin to organicism than the variants I discuss here.

3. Vitalism: science, metaphysics or existence?

I have suggested that we distinguish between, at the very least, two kinds of vitalism, in which the first does not make metaphysically 'strong' claims about life, organism, vital forces, living matter, etc., and the second does make such claims. Thinkers who can be described as belonging to one or the other categories are, of course, not always consistent, or – more interestingly – are pluralistic: that is, one and the same thinker can deny that he (e.g., Barthez 1806) appeals to vital forces, while in an earlier edition of the same work (Barthez 1778) he does appeal to such forces. Or a thinker like Driesch who I have described as more of a metaphysical vitalist can also be read in a more 'experimental-friendly' way (Bolduc forthcoming). Additionally, a non-metaphysical vitalism like Ménuret's (1765) discussion of the animal economy or Claude Bernard's (1878) discussion of the homeostatic properties of the "living machine" – that is, the *milieu intérieur* or "internal environment", "all the vital mechanisms, however varied they may be, have only one object, that of preserving constant the conditions of life in the internal environment" (ibid.: 121, translated and discussed in Walter B. Cannon's canonical paper on homeostasis, Cannon 1929: 400; for more discussion see Cooper 2008) – can be reinterpreted metaphysically. (The latter happens when Hans Jonas takes the concept of metabolism and turns it into something much beyond an empirical concept; he describes metabolism as constituting the organization of organisms for "inwardness, for internal identity, for individuality", while also turning the organism outwards "toward the world in a peculiar relatedness of dependence and possibility": Jonas [1966] 2001: 84, 79).

But in addition to these two forms of vitalism, *meta-physical vitalism* and *non-metaphysical vitalism*, thinkers such as Kurt Goldstein and Georges Canguilhem (Gold-stein [1934] 1995; Canguilhem [1965] 2008) develop what I have called elsewhere an *'attitudinal' vitalism* (Wolfe 2011), that is, a vitalism focusing on the way living beings adopt necessarily organismic *attitudes* towards one another, rather than perceiving other organisms as atomistic aggregates (Huneman/Wolfe 2010). One of the interesting features of this attitudinal vitalism is that it does not resemble a scientific theory per se – unlike the ideas of, e.g., the Montpellier vitalists who did not want to be treated as philosophers, despite their invoking the prestige of figures like Hippocrates who were celebrated as *médecins-philosophes*. A scientific theory makes empirical claims and is provable or refutable. Instead, Canguilhem explains that vitalism is not like geocentrism or phlogiston, two classic superseded scien-tific theories, because it has a specifically *philosophical* place, whether it is scientifically 'validated' or 'refuted', and apart from its status as a scientific 'construction'. Vitalism as an attitude, or a claim about how organisms construct their world(s), is not refutable like claims about the earth as center of the universe or theories of combustion referring to phlogiston rather than oxygen (Canguilhem [1965] 2008: 60).

To be sure, the existential (attitudinal) version of vital-ism can be restated – some might say hypostatized – as a metaphysics as well. For the latter issue is not reducible to the question of whether the vitalist defends the existence of 'mysterious vital forces' or not. And it needs to be carefully separated from the many polemical portrayals of vitalism as 'just a metaphysics' (Monod 1970: 42) or worse, a "primitive conception", as in Charles Daremberg's influential nineteenth-century history of medicine: he has "no trouble whatsoever stating that any attempt to explain life by some *entity* outside of the organism itself, appears to me to be a primitive conception", a throwback to the early, archaic days of medicine (Daremberg 1870: II, 1022).

A sound analysis of vitalism needs these separations and distinctions, also because a thinker can have a vested interest in the phenomenon of vitality itself, without treating this phenomenon as metaphysical, or the basis for a metaphysics (as Aristotle does in his biological writings and his metaphysics when he takes the concrete idea of an individual organism, such as a horse, as the basis for the metaphysical idea of an individual substance). As Claude Bernard put it: "In order to study the phenomena pertaining to living beings and discover the laws that govern them, it is not necessary to know the essence of life itself" (Bernard 1869: 194; see Holmes 1997 for further interpretation). And Bernard is part of a very distinctive repeating phenomenon in the history of vitalism (and the history of biology in parallel), in which thinkers (doctors, anatomists, physiologists, natural historians, etc.) deny that they are vitalists – they often point at their often-deceased predecessor and declare 'No, he is the vitalist!' – while at the same time seeking to describe and systematize distinctively vital properties. Bernard does this with his predecessor, the physiologist and founder of histology Xavier Bichat – but Bichat himself, in his *Discours sur l'étude de la physiologie* (included in Bichat [1800] 1994) says that the Montpellier physicians "considered science philosophically; they would have made greater [scientific] progress if they had known more anatomy – [Albrecht von] Haller only made such great progress for that reason" (ibid.: 289). Further, this phenomenon of denial and affirmation is also part of what we might today call struggles for the disciplinary and conceptual autonomy of biology.

Physiologists, physicians and other figures in the orbit of what comes to be called 'biology' in the same period fight a peculiar battle for disciplinary identity and espe-cially legitimacy, in tension with what we might think of as a metaphysics of life, or a type of scientific practice supported by a metaphysics of life. Indeed, it is perhaps no coincidence that tensions surrounding 'vitalism' as an offending object to be removed, and efforts at conceptual clarification of the scope of a science called 'biology' seem to come hand in hand, from the later eighteenth century to the mid-nineteenth century, whether it is Haller attacking the excessively metaphysical concept of irritability in Francis Glisson, or Bichat attacking the Montpellier vitalists for not having being sufficiently experimental, while propounding his own 'vitalist' con-cept of the two lives, or Bernard applying to Bichat the 'medicine' he had given to his own predecessors, tarring him with the brush of vitalism. It is also true that "it was not only simultaneously but also from the most diverse vantages that the problematic of a comprehensive science of life under the rubric biology came to formulation", and that these "diverse vantages" did not only include "clinical medicine and physiology", but also "theories of life-force"

(Bach 2001: 84, cited according to the translation in Zammito 2018: 356n14). In other words, the question of whether or not vitalism is or was a metaphysics overlaps with the struggles for self-definition of biology, and its own concerns as to the exact scope of the new science of life – a view rather different from Michel Foucault's according to which there was no concept of Life and thus no science of biology in the 18th century (compare Jacob 1973: 39, 92; Wolfe forthcoming b).

4. Conclusion

Vitalism is a concept, or perhaps a family of concepts, implicated in a series of tensions and quarrels for legitimacy in the self-definition of the biological and biomedical sciences. As such, it is not a monolithic doctrine, but most of its significant forms seem very far removed from the caricature presented in older histories of medicine and ongoing in the philosophy of biology. This is particularly true for the caricature of vitalism as a merely irrationalist metaphysical view superseded by the historical development of these of sciences, for example the definition given by Daremberg (1870), Monod (1970) and, less aggressively but with the same content, Gilbert and Sarkar (2000). This recalls the frequent claim, visible in Bichat, Bernard and others, that vitalism had good intentions but in the end was just not a scientific theory, but a metaphysics of life.

Perhaps it is useful to add a final word on distinctions and definitions. As to the former, vitalism can obviously be captured as part of a set of different possible distinctions: most generally, vitalism versus mechanism, or versus materialism, but also, strong metaphysical versus weak non-metaphysical vitalism, or medically based versus biologically based vitalism. When Canguilhem writes "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 she has handled a hoist or a bellows" (Canguilhem [1965] 2008: 64), he has in mind the more biological version of the theory, not that biomedical version articulated by the Montpellier vitalists. A question then would be: is there any overarching conceptual unity to the notion of 'vitalism', beyond these distinctions? I have suggested in some of my work that, faced with the bewildering diversity of uses of the term, often incredibly ahistorical and/or scientifically vague, we should reserve the term for *theories in which the living/non-living distinction is crucial* – which raises the question of definitions of these specific theories.

A set of definitions of the less metaphysical version of vitalism, which I have chiefly discussed here, could read like this: It focuses centrally on claims about organism and organismic unity, or "the animal economy"; it appeals to no foundational 'principle', 'force', 'Self', 'controller', etc. but rather to 'organization', and in that sense it is a 'systemic' theory; its rejection of appeals to a 'soul' also means it cannot be presented as part of a metaphysical dualism – as typical caricatures of 'vitalism' do; its heavily structural focus implies that it is less directly opposed to mechanism than is usually thought (Wolfe forthcoming a). If this vitalism is emergentist, then it is in the sense not of strong but of weak emergence without metaphysical foundation (see Bedau 1997 for this distinction), and thus is compatible with reduction. I grant, however, that this portrayal of vitalism, if considered from the vantage point of contemporary theory in the humanities – rather than from the history and philosophy of science, historical epistemology, or the philosophy of biology –, could seem to be forcing vitalism into too strong a relation to the life sciences (for criticism of my work for doing this, see Greco 2019).

In sum: Vitalism comes in different forms. Some of them seem well beyond the pale for mainstream biomedical and biological thought, although they may also have overlapped and interacted with the early phases of self-definition and self-constitution of biology. Others can serve as useful heuristics or correctives in attempting to deal with the question of the ontological status of living entities.

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