

The organism as ontological go-between: hybridity, boundaries and degrees of reality in its conceptual history

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Abstract

The organism is neither a *discovery* like the circulation of the blood or the glycogenic function of the liver, nor a particular biological *theory* like epigenesis or preformationism. It is rather a *concept* which plays a series of roles – sometimes overt, sometimes masked – throughout the history of biology, and frequently in very normative ways, also shifting between the biological and the social. Indeed, it has often been presented as a key-concept in life science and the ‘theorization’ of Life, but conversely has also been the target of influential rejections: as just an instrument of transmission for the selfish gene, but also, historiographically, as part of an outdated ‘vitalism’. Indeed, the organism, perhaps because it is experientially closer to the ‘body’ than to the ‘molecule’, is often the object of quasi-affective theoretical investments presenting it as essential, sometimes even as the pivot of a science or a particular approach to nature, while other approaches reject or attack it with equal force, assimilating it to a mysterious ‘vitalist’ ontology of non-causal forces, or other pseudo-scientific doctrines. This paper does not seek to adjudicate between these debates, either in terms of scientific validity or historical coherence; nor does it return to the well-studied issue of the organism-mechanism tension in biology. Recent scholarship has begun to focus on the emergence and transformation of the concept of organism, but has not emphasized so much the way in which organism is a shifting, ‘go-between’ concept – invoked as ‘natural’ by some thinkers to justify their metaphysics, but then presented as value-laden by others, over and against the natural world. The organism as go-between concept is also a hybrid, a boundary concept or an epistemic limit case, all of which partly overlap with the idea of ‘nomadic concepts’. Thereby the concept of organism continues to function in different contexts – as a heuristic, an explanatory challenge, a model of order, of regulation, etc. – despite having frequently been pronounced irrelevant

and reduced to molecules or genes. Yet this perpetuation is far removed from any ‘metaphysics of organism’, or organismic biology.

Keywords

Organism, as go-between, organicism, vitalism, mechanism

Introduction

The organism is neither a *discovery* like the circulation of the blood or the glycogenic function of the liver, nor a particular biological *theory* like epigenesis or preformationism. It is rather a *concept* which plays a series of roles – sometimes overt, sometimes masked – throughout the history of biology, and frequently in very ‘valuative’ or normative ways, also shifting between the biological and the social (Canguilhem 2002, Métraux 1998, Gissis 2009). Indeed, it has often been presented as a key-concept in life science and the ‘theorization’ of Life (for instance, in the sense that biology is a science of organisms or is nothing; Grene and Depew 2004). Similarly, at a more conceptual level, perhaps because it is experientially closer to the ‘body’ than to the ‘molecule’, the organism is often the object of quasi-affective theoretical investments presenting it as essential, perhaps even as the pivot of a science or a particular approach to nature (from Hegel onwards, and explicitly with thinkers such as Kurt Goldstein and, with more metaphysical investment, Hans Jonas; see Wolfe 2004, 2010). Conversely, it has also been the target of some influential rejections, classically in Dawkins’ vision of the organism as just an instrument of transmission for the selfish gene (Dawkins 1976), but also, at a historiographic level, as a denunciation of ‘vitalism’ in the history of science (Schiller 1978) or, as Laubichler has noted, in the kinds of attacks that go beyond scientific claims and counter-claims (Laubichler 2000), assimilating its concept to a mysterious ‘vitalist’ ontology of non-causal forces, or some other ‘pre’- or ‘pseudo’-scientific doctrine; or at least, “a highly contestable notion” (Sterelny and Griffiths, 1999, p. 173).

Here, I do not seek to adjudicate between these debates, either in terms of scientific validity or historical coherence; nor do I return to the classic issue of the organism-mechanism tension which has particularly been studied in late nineteenth and early twentieth-century biology (Hein 1972, Allen 2005). It has been observed that we have numerous histories of genetics, but no history of organism (Laubichler 2000). We have studies of the emergence and displacements of the term (Cheung 2006) but not of the shifts in concepts of organism as parts (or foundations!) of a science (Peterson 2010 is a step in this direction, for twentieth-century organicism). Recent scholarship has begun to focus on the transformation of the concept of organism (Huneman and Wolfe eds., 2010), but there is an aspect that has not been emphasized so much (except perhaps under the heading of ‘metaphors of organism’ in Schlanger 1971): the way in which organism is a shifting, ‘*go-between*’ concept – invoked as

'natural' by some thinkers to justify their metaphysics, but then presented as value-laden by others over and against the natural world. It can also be described as a hybrid (sometimes expressing a kind of complex mechanistic view, sometimes a foundational subjectivity), a boundary concept or an epistemic limit case, all of which partly overlap with the idea of 'nomadic concepts'.

1.

The hybrid character of the concept of organism, which functions alternatively as a functional and ontological go-between, and as a polemical concept can serve as a defense of the concept, by showing that it continues to function – as a heuristic, an explanatory challenge, a model of order, of regulation, etc. – in different contexts despite having frequently been pronounced 'caduc', irrelevant, reduced to molecules or genes. Yet this perpetuation is far removed from any 'metaphysics of organism', or organismic biology. In earlier work on the concept of organism I first made a case for an *instrumentalist* concept (Wolfe 2004), which would dissolve ontological debates between reductionist and heavily organismic approaches to the nature or individuality of living beings; more recently (Wolfe 2010) I argued for a weakly ontological view in which organizational concepts, from Montpellier vitalism and Claude Bernard to William Bechtel and Alvaro Moreno et al., were the 'realist' yet also least ideological concept of organism. While I return to what I'll call 'weak organicism' in the last sections of this essay, I will be more interested here in these reality claims as part of a broader phenomenon of hybridity, borrowing, transplantation and displacement.

Indeed, one can ask the question of the *very existence* of the organism, as the journal *American Zoologist* did a few decades ago – one article in this issue is entitled "Do organisms exist?", Ruse 1989), or as philosophers and theoretical biologists have more recently (Wolfe 2004, Cheung 2006, Huneman and Wolfe, eds., 2010, Toepfer 2013). This ontological question – does the organism exist or not? or is it just an artefact, an effect or quasi-anthropomorphic projection of the human mind? – derives from the frequent judgment in molecular biology, according to which biology progresses by 'molecularization' (Morange 1997), which should lead to the disappearance of 'older' concepts such as organism. In reaction, it is often suggested that such concepts have a purely instrumental status, as more or less useful constructs which can be discarded as science progresses. The instrumentalist could say of the organism what Buffon said famously of species, that it is not a natural kind but a 'constructed' category, an "abstract," "general" and temporary construct of the mind, or "vue de l'esprit"¹: a projection onto the

¹ For Buffon, species is not a natural kind but an "abstract," "general" and temporary construct of the mind ("notre ouvrage") which is the result of comparing individuals to each other (Buffon [1753], "L'âne," pp. 384-385). His successor Lacépède explicitly describes species as a "vue de l'esprit," a mental construct, in his commentary and extension of Buffon's work (Lacépède [1800], "Sur la durée des espèces," p. xxxiii).

world which enables us to grasp it otherwise than as a heap of dead matter or a chaos of atoms in motion; in other words, a heuristic construct.

I am leaving aside the old Aristotelian question of organisms as individual substances, that is, the idea that it is a 'fact', either of our intuition or of nature, that organisms, particularly mid-size entities, represent paradigms for our idea of individuals; as James Lennox puts it, for Aristotle, "paradigm natural substances were not the common material constituents of the universe, but the most active, complex and organized of bodies, the living ones" (Lennox, 2001, pp. 108-109); recent work in biology challenges some of these intuitions, from the work focusing on the role of the bacteria in our gut in maintaining our immunological individuality (Pradeu 2012) to corals and forests (Bouchard 2006). These are fascinating questions, but belong to a separate, specifically metaphysical dimension of the issue. My aim here is not to defend a metaphysical thesis on the nature of biological individuality, or to illustrate its radical denial in favor of evolving scientific change (as in Rosenberg's instrumentalism: Rosenberg 1989) in some historical cases, despite how the hybridity described here could sound 'instrumentalist'. Significant metaphysical theses that could be used in support of an irreducible organism concept include the 'animalism' defended by Eric Olson (in which our personal identity is defined by our biology in the sense that we are 'human animals' more fundamentally than we are Lockean psychological persons defined by the continuity of their thoughts, Olson 1997) and the form of Aristotelian substantivalism defended by David Wiggins, which invokes "an unmysterious but pre-empiricist notion of substance" (Wiggins, 2001, p. 80). But whether a substrate, a total system of interrelations, or some other 'substance', these theories are competing claims concerning the nature of a *real* organismic identity. Instead, my analysis tends to show how the organism concept is always borrowed from some other realm (from the metaphysical to the physical or inversely; or from the physical to the biological, or from the biological to the social), as a go-between, yet a go-between with a genuine conceptual dimension.²

From the heyday of psychophysics in the nineteenth century to the triumphant reductionist proclamations of biochemists from Emil Du Bois-Reymond to Jacques Loeb in the next generations, in diverse, not particularly homogeneous scientific trajectories, we often encounter the assertion that the organism has been replaced by molecular explanations. Additionally, the properly philosophical analogue of these 'empirical' reductionist claims is Ernest Nagel's effort to restate the teleological language of organismic biology in purely mechanistic terms (Nagel 1961). Sometimes this reduction, elimination or otherwise, erasure of organism is presented in negative terms (as a loss of meaning, a dehumanization, etc.), but

² In that sense, my analysis is located halfway between the aforementioned *metaphysical* perspective (are organisms, i.e. biological individuals in this context, real? in what sense? Substance, process, interrelation of parts, continuity of consciousness, etc.?) and the study of organisms as *metaphors* (Schlanger 1971) or as *epistemic things* (Rheinberger 1997a).

more often it is presented as a neutral statement of fact: “both scientists and philosophers take ontological reduction for granted... Organisms are ‘nothing but’ atoms, and that is that” (Hull, 1981, p. 282). Yet such neutral statements sometimes have implicit normative content, namely, recommending that we no longer do revisionary metaphysics of organism, understood as the project of revising our scientific worldpicture to supplement it with something additional (whether this be an ‘entelechy’, as in Driesch, a ‘drive’ as in E.S. Russell or an ‘organismic law’ as in Elsasser).

Similarly, despite the presence and even usefulness of the (or ‘an’) organism concept in disciplines such as embryology, ethology or evolutionary biology (Pepper and Heron 2008), some researchers in fundamental biology (Di Paolo 2009) end up stating that life itself does not exist. This recalls the claim that Life is no longer an object of empirical research, as in François Jacob’s famous pronouncement: “We no longer inquire into Life today in laboratories” (“On n’interroge plus la vie aujourd’hui dans les laboratoires”: Jacob, 1970, p. 320), which in fact has also been observed historically about nineteenth-century experimental life science: “Treviranus’ question ‘What is life?’ had . . . ceased to stand as the practical starting point for physiological research” (Coleman, 1977, p. 13). More recently, Edouard Machery has argued (Machery 2012) that we should give up seeking to provide definitions of life, as these are either folk concepts, or unresolvable with other competing definitions: namely, evolutionists, theoretical biologists, self-organization theorists, molecular biochemists and artificial life researchers cannot agree on a definition.

While Machery’s point is well taken,³ one could observe (a) that there is a *reality* to certain life-concepts – I shall speak instead of forms of organization (Bechtel 2007, Mossio and Moreno 2010, Moreno and Mossio forthcoming), here, that of organism – and (b) that there is a particular *productivity* of the organism if it is understood as a go-between, not as some archaic vital substance or irreducible individuality. The organism in this desubstantialized yet real sense need not (indeed, cannot) be taken in the fearful emotional sense of anti-reductionist ‘biophilosophers’ like Raymond Ruyer (prominent in post-war French thought and something of an influence on thinkers including Georges Canguilhem and Gilles Deleuze). Ruyer, in this quite close to a tradition of Romantic biophilosophy that was mainly present in Germany, wants to withdraw the organism from any possible mechanist explanations, insisting on its non-spatiality and sheer potentiality (Ruyer, 1946, pp. 8, 14, 27, 58, 94). Ruyer’s fear of a universe composed of inanimate matter, with shocks and displacements explainable exhaustively by the laws of mechanics, a universe in which the organism is no longer anything more than a machine, leads him to warn: “If you are shocked by what amounts to a generalized ‘theory of

³ I have offered some criticisms of my own against ‘criteria-based’ theories of organism, which he calls ‘definitional’, in Wolfe forthcoming.

organism', . . . you had better see clearly that the choice is between this theory and that of a 'generalized molecule'" (Ruyer, 1952, p. 166).

So on the one hand, the organism is an *oppositional* concept, often with polemical and/or affective value: it serves to assert one 'realm', one ontological or scientific domain over and against another (the physical universe as a whole; mechanism; inanimate matter; forms of life below the threshold of consciousness – for defenders of the concept of organism, however diverse they may be, viz. Walter Elsasser and Hans Jonas share neither a metaphysical nor a scientific outlook, do not tend to be interested in 'microorganisms' or forms of life such as the amoeba or the protozoa. Von Uexküll's tick would be something of a counterexample, for it is an empirical case meant to justify a holist theory of organism, in which each organism lives in a dynamically constituted *Umwelt* which is unique to that organism: ticks perceive only that which is relevant to them, just as dogs and seahorses do. Organisms on this view are "closed unit[s]" (von Uexküll, 2010, p. 42), as are their *Umwelten*: "Each environment forms a self-enclosed unit, which is governed in all its parts by its meaning for the subject" (p. 144). Von Uexküll's further holist emphasis is that we should understand the tick, like every other organism, as a "subject" rather than as a "machine": "The biologist . . . takes into account that each and every living thing is a subject that lives in its own world, of which it is the center. It cannot, therefore, be compared to a machine" (p. 45). Von Uexküll's tick, like Kurt Goldstein's brain-damaged patients (Noppeney 2001), is not a *model organism* but rather a *paradigm case* of organism as an irreducible, individual substance.⁴

But on the other hand, organism is a *hybrid* concept. I am not using this term in a special technical sense in which 'hybridity' would have a specified theoretical meaning. Rather, I simply mean that from its early argumentative usage onwards (i.e., as a term of argument, not a casual or obscure term), through its trials and tribulations as a key term of biology or a term to be rejected, organism is used a hybrid sense. I mean by this that one author will use the organism concept to give metaphysical grounding to an empirical claim, while another author will insist that it is purely empirical – not to mention further instances of hybridity between the biological and the social (Gissis 2009), the biological and the neuropsychological, and so on.

Its earliest 'conceptual' usage, that is, not its very earliest usage (which seems to have been in the fourth edition of John Evelyn's *Sylva*, 1706, first published in 1664: Cheung, 2006, p. 322) but its usage as a conceptual or technical term was in the debate between Gottfried Wilhelm Leibniz and Georg-Ernest Stahl in the early years of the eighteenth century, based on Leibniz's reply to Stahl's *Theoria medica vera* (1707), and the ensuing controversy between the two authors. This ultimately bore the title *Animadversiones circa Assertiones aliquas Theoriae*

⁴ Goldstein credits von Uexküll explicitly for this concept. In addition, it is not irrelevant that Von Uexküll was one of the founders of theoretical biology as a discipline, authoring what is probably the first work to bear that title (von Uexküll 1926).

Medicae Verae clarii Stahlii, cum ejusdem Leibnitii ad Stahlianas observationes responsionibus or, more unkindly, *Negotium otiosum* (Huneman and Rey 2007, Duchesneau forthcoming).⁵ (I say ‘conceptual’ or ‘technical’ usage because the term is used even after Leibniz, e.g. in the *Encyclopédie* – where it does occur, contrary to the claims of earlier scholars – in a yet undefined sense, as synonymous with ‘mechanism’.⁶) In the next sections (2 and 3) I address some particular historical cases, from the Leibniz-Stahl debate to eighteenth-century Montpellier vitalism, in order to further illustrate the fruitfulness of this hybrid, non-essential, and perpetually nomadic concept of organism. I then contrast this concept with a stronger form of organicism (section 4) before concluding.

2.

While Stahl insists on the ontological uniqueness of organism, Leibniz, for whom “everything in nature is to be explained mechanically” (Leibniz, first essay on Stahl, 1708, cited from the bilingual edition in Carvallo, 2004, p. 73) and who often explains bodies in terms of size, shape and motion, discusses organisms as particular, but special cases of a mechanical universe: he calls them “machines of nature” (Fichant 2003). The term ‘organism’ is often presented as first appearing in his *New System of Nature*, published in 1695 in the *Journal des savants*, but he uses it in Latin and German as well (and in a short 1686 text entitled “Du rapport général de toutes choses,” he speaks of “all the parts of matter” as being “full of organism” (*pleines d’organisme*): # 311 in Leibniz, 1999, p. 1614). But Leibniz primarily uses the term “machines of nature,” which he defines as machines in their most minute parts (“moindres parties”), contrary to machines created by human artifice (Leibniz, 1978, IV, p. 482); machines down to infinity, also in the sense that bodies contain seeds which can never be destroyed (*ibid.*, p. 475); some of this language (infinity and interrelation of parts) is also in Malebranche. In the *Monadology* (§ 64) he presents this terminology as a definition of living bodies. We should notice that the Leibnizian ‘organism’, in this sense, is a complex kind of machine: “The organism of a living being (*organismus viventium*) is nothing other than a divine mechanism which is more subtle than an ordinary mechanism in the infinity of its subtlety” (Leibniz, 1961, 16, § 13; Leibniz, 1978, I, p. 15). Leibniz denies any kind of extra-causal influence on bodies of a vital principle that would be separate from bodies as a whole, which is precisely what Stahl’s *anima* is: soul as the motive force or controller in the body.

⁵ Leibniz wrote some remarks on the *Theoria medica vera* in 1709, which he had sent to Stahl by Karl Hildebrandt von Canstein. Stahl responded to these some months later, but Leibniz was unconvinced. He reiterated his critique in the 1711 *Replicatio ad Stahl observationes*, to which Stahl replied in even greater length.

⁶ In the *Encyclopédie* articles “Fibre” and “Nutrition” (VI, 670; XI, 288) the terms “mécanisme” and organisme” are used interchangeably, e.g. “the mechanism or organism of nutrition.” There is no article “Organism(e)” in the *Encyclopédie*, contrary to what is asserted in Ibrahim 1999, 652, an otherwise very useful article (she refers to *Enc.* XI, 360, which is indeed the beginning of the important “Economie animale” article).

To be clear, these are not just competing empirical explanations of soul:body or whole:parts interaction, both of which would amount to ‘definitions of organism’; they are *ontologically different*. Better put, Leibniz refrains from fully ontologizing the concept of organism: “‘Organism’ and ‘mechanism’ in Stahl designate two regions of being. Leibniz, on his part, hardly says ‘organism’, preferring terms such as ‘organized being’, ‘organized body’ or ‘organic machine’, because organization is a univocal concept, equally applicable to inanimate or artificial beings, and to living beings” (Huneman and Rey, 2007, p. 223). Granted, both concepts are opposed to that of ‘machine’, but the mainstream sense of ‘organized body’ or ‘animal economy’ (Wolfe and Terada 2008) differs from that of ‘machine’ *incrementally* rather than *categorically*, whereas for Stahl, organism is something unique within Nature as a whole.

It is not too big a step from this incremental vision of organism as a particular, complex arrangement of matter, which we also find in eighteenth-century vitalism, as I discuss below, to the project of a science specific to such entities, namely biology (on the shifts involved, both terminological, instrumental-material and ontological, see Caron 1988, McLaughlin 2002, Wolfe 2011). The term ‘biology’ is generally held to have appeared in the 1790s with Lamarck and Treviranus, which would then imply roughly a century’s interval between the first technical usage of ‘organism’ and that of ‘biology’, from the early 1700s to the late 1790s. But in fact, recent work has shown that ‘biology’ appears as early as 1766 (McLaughlin 2002), with then a terminological fluctuation for some decades (terms such as ‘zoonomy’ being other candidates) – which itself reveals a desire to account for a reality, whether we call it a practical and instrumental reality, or an ontological state of affairs.

For instance, when Caspar Friedrich Wolff seeks to redefine embryology, fifty-odd years later, he states that one of the main goals of his “theory of generation” is not just to defend epigenesis as an account of the formation of the embryo, but also more broadly, to define a science of the causes and effects specific to the formation of organisms (“organized bodies,” Wolff, 1764/1966, p. 36f.). What is specific to the embryo and more generally the organism is the presence of a force Wolff calls *vis essentialis*. The oppositional motivation in these classic modern concepts of organism, from Stahl to Wolff and beyond, is to produce a model of life which is non-mechanical, or not fully mechanical. One can describe them as ‘holistic’, to use an early-twentieth century term coined by Jan Christiaan Smuts (although curiously, this term, which is associated with systems theory, is not, contrary to a widespread misconception, a doctrine specifically about living beings, Wolfe 2010).

For the holist, the difference between an organism – a flesh-and-blood creature which falls ill, resists the challenges of its environment and conversely, assimilates the substances that will enable it to survive – and a machine, is a difference between two types of ‘whole’ (as is often mentioned, ‘holism’ comes from the Greek *holos*, ‘whole’). If a living whole is greater than the sum of its parts, or conversely, in Aristotle’s example, if a hand cut off from the body is no

longer a hand (*Metaphysics* Z 11, 1036b32⁷), in what Deborah Modrak has described as a normative usage of the natural function of an organ (Modrak 1996, 158), by contrast, the inert or passive whole of a machine is, for Leibniz as for a variety of thinkers he influences, a mere “aggregate” of parts (Wolfe 2006). Holism often, as in the early twentieth-century German *Ganzheitsbetrachtung*, conceives of its object in opposition to ‘mere mechanism’, atomism, reduction, and other instances of explanation in terms of decomposition into parts. But the historical reality yields a different picture.

3.

Machine and organism are in interplay here, with the concept of organism being articulated, partly (in Leibniz) or wholly (in Stahl), in contradistinction to the concept of machine. Two dimensions at least are involved here. One is the type of *individuality* that is being argued for: what kind of individual is the organism? Indeed, all or most theories of organism attempt to justify the existence of a particular kind of individuality. As Claude Bernard says, “the physiologist and the physician must never forget that the living being comprises an organism and an individuality . . . If we decompose the living organism into its various parts, it is only for the sake of experimental analysis, not for them to be understood separately” (Bernard, 1865/1984, II, ii, § 1, p. 137). But the other dimension is a kind of hybridity or nomadism, in which neither machine nor organism are ‘pure’ or entirely separate from one another (Canguilhem 2008). That is, historically, the evidence is in favor of such a status of the organism concept. Various examples can be given, but I shall limit myself to four, from the seventeenth to the nineteenth centuries.

First, words like ‘body’ and ‘machine’ are often defined interdependently, e.g. when ‘machine’ serves as a synonym for ‘body’ in French. In the late seventeenth century, the *Dictionnaire de l’Académie* defines ‘machine’ in 1694 as “a set of parts or organs which form a whole, living or not, and produce determinate effects without transmitting a force externally; organism, body” (Cayrou, 1948, s.v. “Machine,” p. 530). By the nineteenth century the situation is different, with the *Encyclopédie méthodique* explaining that one should no longer use the expression “machine humaine” ... but that “animal economy” or “organism” are suitable substitutes:

It is preferable to use the synonymous expressions ‘living economy’, ‘vital economy’, ‘animal economy’, ‘organism’, ‘organic mass’, ‘the entire economy of the human body’. The term ‘machine’ seems to refer to a system of causes and

⁷ The idea is that the material structure of a part *per se* matters less than ‘where’ it is: “blood will not be blood, nor flesh flesh, in any and every state” (*Generation of Animals* I.18, 722b34); a hand can only be understood as a hand inasmuch as it belongs to an ensouled body, i.e., matter animated by a form. Thus the material part, the hand, is derivative of the formal part, the soul. It is precisely this mere homonymy between a ‘dead’ hand and a ‘live’ hand which Democritus misses, in Aristotle’s view.

effects which belongs wholly to the mechanistic theory (“Machine,” Vicq d’Azyr, ed., 1808, p. 310).

Second, as I have discussed elsewhere (Wolfe 2014), even paradigm cases of ‘mechanism’ or ‘the mechanical philosophy’ (from Descartes and Italian iatromechanism to Boyle’s natural philosophy) are filled with functional language, including ‘function’, ‘use’ and the ‘office’ of an organ. And they are concerned with properties of the organism such as health and survival, that is, not just with microstructure or laws of collision, if ‘medicine is the most useful of the sciences’ (this aspect of Descartes comes out strikingly in the essays collected in Gaukroger, ed., 2000, including notably Sutton 2000). In that sense, mechanist concepts of Life and their (purportedly opposite) organicist rivals in fact exist in a historical, conceptual, and instrumental reality which is much more hybrid and ‘dialectical’, in the simple sense that they do not function as logical contraries, but as progressive modifications and displacements in the project of understanding one and the same object, the living organism. What I describe as hybridity and go-betweenness at the conceptual level can of course also be studied in the materiality of scientific apparatuses, as Rheinberger has done influentially: “Conjunctures, hybridizations, and bifurcations basically describe types of shifts, linkages, and descents through which the dynamics of reorientation, fusion, and proliferation of particular experimental systems is made possible” (Rheinberger, 1997b, p. 250). But returning to the interplay of machine and organism models, we indeed find the same in a case we have been conditioned to think of as an opposite: the school of Montpellier vitalism (associated with the Montpellier Medical Faculty), especially in the second half of the eighteenth century (Wolfe and Terada 2008).

Third, then, is Montpellier vitalism, the best-known figures of which were Paul-Joseph Barthez and Théophile de Bordeu, to whom we should add less famous, but equally significant individuals such as Henri Fouquet and Jean-Joseph Ménéret de Chambaud. For present purposes, what is significant about the vitalist approach to the organism (which it mainly refers to as “animal economy”) is that it is articulated, not by postulating the existence of an invisible vital force, but in structural terms, that is, in terms that describe the functional organization of a system of living organs, as a kind of extra-complex mechanism with purposive properties. In a programmatic article in Diderot and D’Alembert’s *Encyclopédie* entitled, precisely, “Economie Animale,” Ménéret presents those who explain the functioning of the living body by the presence of an immaterial soul (i.e., “animists”) and those who reduce the body to a mere machine, as equally mistaken: “They did not even pay attention to the *organic* structure of the human body which is the source of its main properties” (Ménéret, 1765, p. 364b). But this organic-structural view is *not anti-mechanistic*:

everything leads us to believe that the human body is like the other machines which art can assemble, disassemble, and witness in their tiniest springs; it is a fact known to any artist, that in even the most complex machines, the entire

movement rests and bears on one particular piece from which the movement began, and from which it spreads to the rest of the machine, producing various particular effects in each particular spring. It is only on the condition of such a spring in man that we can come to properly know and determine the manner of acting of the general causes of life, health, sickness and death (Ménuret de Chambaud, 1765, p. 362b).

Fourth, the most famous case of this twofold vision in which mechanistic and organismic levels are intertwined, is probably Claude Bernard, who described the organism as an “admirable machine” but also a “living machine” (Bernard 1865, II, ch. i, §§ iii, vii): “[W]hat distinguishes a living machine is not the nature of its physico-chemical properties, complex as they may be, but rather the creation of the machine which develops under our eyes in conditions proper to itself and according to a definite idea which expresses the living being’s nature and the very essence of life” (*ibid.*, ch. ii, § 1; Huneman and Wolfe forthcoming).

4.

In this back and forth of definitions between living body and machine (including, on the latter side, anatomical-structural presentations of the body), where sometimes it is the components which are conceptualised as so many “little lives” (as in the celebrated vitalist metaphor, the organism is like a “beeswarm,” each component of which is already a ‘life’ of its own), it is hard to distinguish clearly between the metaphysical level and what we would today call the scientific level. For the concept of organism is a *porte-manteau* concept, on which one hang various, rather disparate research programs in physiology, biomedicine and philosophy. Even if we say, following Canguilhem that the elaboration of an organism concept “can be summed up as the search, by naturalists, physicians and philosophers, for replacements or semantic equivalents for the soul, which could account for the increasingly well-established fact of the functional unity of a system of integrated parts” (Canguilhem, 1989, p. 551), this does not mean it was a straightforward articulation of a neutral, ‘scientific’ concept. Notably, because it is also a *polemical* concept, and often one which belongs to a revisionary program, sometimes known as ‘organicism’.

Organicism, in philosophy and in theoretical biology (itself extending work done earlier in embryology, physiology, biochemistry and more recently, ecology and evolutionary biology), asserts the existence of an irreducible reality of organisms. In the latter discipline, figures such as Walter Elsasser in the 1960s, Robert Rosen in the 1980s, and – with a different, often more metaphysically oriented program – Francisco Varela between the 1970s and his death in 2001 seek to formulate ‘laws’ or systemic regularities that would define the organism, often using models derived from physics or dynamic systems theory. In the early twentieth century, the organicism of Hans Driesch (often termed ‘neovitalism’) lacks such conceptual tools, and founds itself on the challenging experimental ‘evidence’ of the equipotentiality of sea urchin eggs. As is

well known, Driesch gradually leaves the domain of biological science for that of metaphysics, theorizing the 'entelechies' that, on his view, explain these properties.

In fact, as I indicated above with the case of Montpellier vitalism, there are both historical and conceptual reasons to take such strong (ontological) claims with a grain of salt. The type of organism concept which emerges with the montpelliérains is explicitly hostile to any appeal to mysterious, non-experimentally (or experientially) based entities, not least because it comes out of a medical context, implying a focus on living rather than dead bodies, and on the living body as a 'total' living system rather than as a parcel of decomposable matter. As distinguished from 'strong organicism', we could call this concept 'weak organicism'.

For instance, the erstwhile Dean of the Montpellier Medical Faculty, Paul-Joseph Barthez, who had initially spoken of a vital principle in his 1778 *Nouveaux éléments de la science de l'homme*, added a chapter to this work entitled "Skeptical considerations on the nature of the vital principle" in the revised edition, stating "I am as indifferent as can be to ontology considered as the science of entities" (Barthez, 1806, p. 96, n. 17). Nevertheless, weak organicism is still organicism: notably, it will criticize the "mechanists" (in the restrictive sense of those who explain the functioning of the body as if it were a machine), not in the name of irreducible holism, but for failing to acknowledge or do justice to "the organic structure of the human body, which is the source of its main properties" (Ménuret 1765, 364b), by geometrizing it. Bordeu speaks of the mechanical analogies popular during the previous hundred years (e.g. Descartes, Borelli, Boerhaave) as "the playthings of our fathers":

Spare us, once and for all, all these tiny fibres, pressures, globules, thick substances, sharp angles, lymph, hammers and all the rest of the equipment from mechanical workshops with which [earlier doctors] filled the living body – they were the playthings of our fathers (Bordeu, 1764, in Bordeu, 1818, II, p. 670).

Strong organicism, which asserts the intrinsic, objective reality of the organism, is clearly opposed to a Kantian, *projective* vision, which inasmuch as it is not an appeal to an intrinsic reality, is also closer to the standpoint of the Montpellier vitalists, but also to Kurt Goldstein's *constructivist* approach, which emphasizes the inherently constructed character of organisms, but also that this constructed character is part of the dynamic activity *of organisms* (Goldstein 1934/1995, Ferrario and Corsi 2013). Briefly put, these approaches are non-substantialist like the others I have discussed, but in addition, they are specifically constructivist, i.e., they concur in defining organism as a meaningful construct, which also comprises the idea of making a part of Nature intelligible (or meaningful). In an evocative example suggested by Daniel Dennett, if I am being pursued by a tiger in the rain forest, I will be better off treating as an intentional agent (an organism, in the present context) rather than as a mere heap of atoms or molecules. This will enable me to predict its behavior better and increase my chances of survival (Dennett 1987; neither Kant nor Goldstein give the idea that our perception is irreducibly organicist, such

a Darwinian coloration⁸). One of the original organicists in the twentieth-century biological sense, Joseph Needham, also took this position but from a more ‘total systemic’ standpoint, according to which organicism is a *stance* rather than a theory. For Needham, “all things are organisms and all things are atomic systems also. You choose your standpoint,” or in more detail,

Both [mechanism and vitalism] are co-extensive with experience, but one is appropriate to science, the other to philosophy; there is no further need for any fighting to go on in biology between those to whom the concept of organism is the more profound and to those who feel the same about that of mechanism, for all things are organisms and all things are atomic systems also. You choose your standpoint, and you see what is to be seen from that standpoint (Needham, 1930, pp. 84-86).

Conclusion

If the organism is a hybrid but also a go-between concept, is it then just a construct, since we are not dealing with absolute, isolable entities or states of being? I have suggested at least two reasons why not. One is that there are definitely more ways to study the materiality of worms and wombats, but also slime molds, coral reefs and giant fungi, than just as metaphors. Another is that these are individual substances, even if their boundaries are not always clear or matching up to our common intuitions of what an individual would be (Bouchard and Huneman, eds., 2013); as Dupré recently put, “the omnipresence of symbiosis should be seen as undermining the project of dividing living systems unequivocally into unique organisms” (Dupré, 2012, p. 8). In addition, some biologists call for an organism concept, not as an umbrella concept to organize all of some kind of reconceived ‘organismic’ biology, nor as a reactive concept against ‘mechanistic’ or ‘reductionist’ science, but simply as a way of doing justice to certain kinds of systems (of which termite mounds, with their homeostatic properties, are a well-known case: Turner 2006, Turner 2007, ch. 2 and Turner 2013). But these kinds of ‘reality’ are not grounded on substantialist metaphysical definitions.

Further, what I’ve referred to as its hybridity – the way that mechanistic concepts of body (e.g. Cartesian physiology) are not without embodied, organismic properties, just as vitalistic concepts of, e.g. the animal economy are not without mechanistic specifiable features – also presupposes a degree of reality of organisms. This reality in that sense is partly correlated with the emergence of biology as a science, even if biologists and philosophers have observed more recently (Jacob 1970, Machery 2012) that there is no need for biology to have ‘life’ or any

⁸ It can also be argued, as Wiggins does, that this capacity of organisms to ‘construct the(ir) world’ meaningfully has irreducible nomological properties, but that would, again, be a metaphysical claim concerning the nature of certain types of substance, rather than an attempt at the ‘historical epistemology’ of the organism as go-between, as proposed here. (I thank Adam Ferner for helping me to see this with regard to Wiggins.)

other sharply defined concept at its center; if, that is, “Biology has developed as a discipline without having anything terribly precise to say about exactly what its domain of inquiry is,” so that “perhaps ‘alive’ is not a crisply delimited category in nature” (Sober, 2003, p. 318).

An additional layer of hybridity and go-betweenness is the way, e.g. in the Leibniz-Stahl debate but also in Claude Bernard, that organism is alternately invoked as a simple natural ‘case’ which buttresses a metaphysics, or on the contrary as a value-laden entity which stands against a ‘merely’ physical world, as is the case, partly, in Kurt Goldstein’s theory of organism. Thereby, despite having frequently been pronounced ‘caduc’, irrelevant, reduced to molecules or genes, the concept of organism retains a productivity – nomadic but thereby real. Yet this perpetuation is far removed from any ‘metaphysics of organism’, or organismic biology.

Rather than an essence of organism or a substantialist theory (selfhood, subjectivity, personhood, continuity, etc.), there is this go-betweenness or nomadism, itself resembling some other terms from the history of science, like “boundary concepts” or “trading zones” (Star and Griesemer 1989, Galison 1999); to borrow a term from Rheinberger, who applied it to the admittedly deliberate constructs he names “epistemic things,” the organism is a “joker” (Rheinberger, 1997b, p. 246). If certain conceptual constructs are jokers for the world of practice, conversely, certain material-conceptual constructs are also jokers for the world of biological theory. As I’ve shown in some select cases (others might choose to focus more on Kant, Viktor von Weizsäcker or systems biology), the historian and the philosopher of biology might benefit from paying some attention to the organism concept, whether out of interest in individuality and organization, or in the emergence of the science of biology.