

# HOLISM, ORGANICISM AND THE RISK OF BIOCHAUVINISM

by Charles T. Wolfe

**Abstract.** *In this essay I seek to critically evaluate some forms of holism and organicism in biological thought, as a more deflationary echo to Gilbert and Sarkar's reflection on the need for an 'umbrella' concept to convey the new vitality of holistic concepts in biology (Gilbert and Sarkar 2000). Given that some recent discussions in theoretical biology call for an organism concept (from Moreno and Mossio's work on organization to Kirschner et al.'s research paper in Cell, 2000, building on chemistry to articulate what they called "molecular vitalism," studying the "vitalistic" properties of molecular, cellular, and organismal function, and Pepper and Herron's suggestion in their 2008 paper that organisms define a category that evolutionary biology cannot do without), the question, what concept of organicism are they calling for? To what extent are such claims philosophically committed to a non-naturalistic concept of organism as organizing centre, as a foundational rather than heuristic concept – or possibly a "biochauvinism," to use Di Paolo's term (Di Paolo 2009)? My aim in this paper is to conceptually clarify the forms of holism and organicism that are involved in these cases (and I acknowledge that the study of early 20<sup>th</sup>-century holisms [Peterson 2010] indicates that not all of them were in fact 'organicist' or 'biologistic'). I suggest that contemporary holists are still potentially beholden to a certain kind of vitalism or "biochauvinism"; but that when they reduce their claims to mere heuristics, conversely, they risk losing sight of a certain kind of organizational "thickness", a "vital materiality" (Wheeler 2010) which is characteristic of biological systems (Bechtel 2007). And I ask if it is possible to articulate a concept of biological holism or organicism which is neither an empirical 'biochauvinism' nor a metaphysical 'vitalism'?*

I. A question sometimes asked in recent reflections at the intersection of the philosophy of biology and so-called 'historical epistemology' is, do organisms have an ontological status? Now, we should note immediately that there are at least two very different ways to answer this question in the affirmative. One is more

1 philosophical, and seeks to provide criteria, e.g. of individuals  
2 which organisms instantiate particularly well; from Aristotle to  
3 Hegel and Jonas, this can be termed a strong holist option, but let  
4 us again stress, in a *philosophical* context, for as we shall see, it is  
5 possible to defend a holist claim for the ontological uniqueness of  
6 organisms, on a *biological* basis as well (to be clear, I do not have  
7 in mind a distinction between ‘metaphysical’ and ‘experimental’  
8 here). A philosophical defense of strong holism as regards biolog-  
9 ical individuals will tend to be more stipulative, appealing for  
10 instance to the nature of whole/part relations and insisting that in  
11 organisms, there is a special type of interrelation between parts.  
12 In contrast, strong holism of the biological sort will typically  
13 appeal to the empirical criteria defining actual organisms – but  
14 which criteria?, would be the immediate retort, pointing to the  
15 lack of any unifying concept for the diversity of actual organisms,  
16 from drosophila to the Portuguese man-o-war<sup>1</sup>.

17 There are also diverse answers of the negative variety, which  
18 I will be less interested in here. They include a kind of absolute  
19 physicalism, which is more of an intellectual *vue de l’esprit* than a  
20 position actually encountered amongst most working natural  
21 philosophers: on this view, what is real is the entities specified in  
22 fundamental physics, and since organisms do not belong to this  
23 class of entities (however much some former physicists struggled  
24 in the 1960s to find ‘organismic laws’, like Walter Elsasser<sup>2</sup>), they  
25 can have nothing other than a ‘folk’, ‘cultural’ or perhaps ‘psycho-  
26 logical’ status. More common is a general dismissal of the very  
27 question, in the favor of a kind of evolving, instrumentalist con-  
28 sensus, according to which there is no point in debating the  
29 ultimate reality or ontological status of organisms, since what  
30 matters is the theoretical terms science uses in its work, and these  
31 constantly evolve (thus ‘organism’ gave way to ‘gene’, but even  
32 ‘gene’ now seems like a construct, since it can no longer be

<sup>1</sup> J. PEPPER, M HERRON, *Does biology need an organism concept?* «Biological Reviews», 83, 2008, pp. 621–627.

<sup>2</sup> W.M. ELSASSER, *Quanta and the concept of organismic law*, «Journal of Theoretical Biology», 1(1), 1961, pp. 27-58 ; *Reflections on a Theory of Organisms. Holism in Biology*, Johns Hopkins University Press, Baltimore, 1998.

1 thought of as «an inherently stable, discrete stretch of DNA that  
2 encodes information for producing a protein», which is copied  
3 faithfully before being passed on; rather, we now know that  
4 «stability lies in the system as a whole, not in the gene»<sup>3</sup>).

5 Closer to my general interests, although I will not explore  
6 this option here, is a more ‘historicized’ approach, in which the  
7 reality of organisms is neither bluntly asserted – as is predomi-  
8 nant in theoretical biology and most Continental ‘biophilosophy’<sup>4</sup>  
9 – or denied, in favor of atoms, molecules, or selfish genes. In-  
10 stead, it is examined in a diversity of historical régimes, contexts,  
11 sometimes with an increased focus on the nature of the experi-  
12 mental scientific apparatus involved. For instance, Hans-Jörg  
13 Rheinberger describes experimental systems while emphasizing a  
14 cognitive, constructed level of the effectivity of scientific practi-  
15 ces: experimental systems do not just inhabit a world of ‘things’  
16 but also, what he calls «graphematic spaces», capable of «differen-  
17 tial reproduction»<sup>5</sup>. Thus for our purposes, the reality of organ-  
18 isms for an embryologist in the school of Wilhelm Roux is not  
19 the same, e.g., as that experienced by an eighteenth-century  
20 Montpellier *medical* vitalist insisting on the difference between  
21 medical mechanistic models of the body and the ‘animal econo-

<sup>3</sup> E. JABLONKA, M.J. LAMB, *Evolution in Four Dimensions: Genetic, Epigenetic, Behavioral and Symbolic Variation in the History of Life*, MIT Press, Cambridge, Mass., 2005, p. 7.

<sup>4</sup> ‘Biophilosophy’ is a term that was popular in the post-war decades in French ‘épistémologie’ (and to some extent also in the German versions, where authors like Kant and/or Hegel played a greater role, e.g. Gerhard Vollmer). It was often presented as not being guilty of the reductionist excesses of analytically oriented ‘philosophy of biology’. My interest here is not to choose between the two but to judge the claims of certain forms of biological holism. On the emergence of philosophy of biology as a discipline in contrast to ‘biophilosophy’ see J. GAYON, *La philosophie et la biologie*, in *Encyclopédie philosophique universelle*, vol. IV, ed. J.-F. Mattéi, PUF, Paris, 1998, pp. 2152-2171, which he has reprised with the more specific focus of ‘vitalism’ in his *Vitalisme et philosophie de la biologie*, in *Repenser le vitalisme*, ed. P. Nouvel, PUF, Paris, 2011, pp. 15-31.

<sup>5</sup> H. J. RHEINBERGER, *Experimental Systems – Graphematic Spaces*, in T. LENOIR, (ed.), *Inscribing science: scientific texts and the materiality of communication*, Stanford University Press, Stanford, 1998, p. 287. Thanks to Claudia Manta for suggesting this reference.

1 my' (a term often used in that period to describe the functionally  
 2 interdependent, physiological system of the body, as distinct from  
 3 the mere machine). Curiously, both friends and foes of ho-  
 4 lism/organicism<sup>6</sup> ignore the potential resources the historical  
 5 view would afford them, being content instead to assert or deny  
 6 an ontological state of affairs.

7 Here I will not pursue this more historical route, as I shall be  
 8 concerned with some varieties of biological holism, mainly in the  
 9 twentieth and twenty-first centuries, which I will seek to evaluate,  
 10 primarily in the form of a brief internal critique. To be clear, I am  
 11 not arguing for one sharply delimited 'reductionist' or 'holist'  
 12 position, but rather, I am evaluating some of the tensions or  
 13 excessive commitments carried by various forms of holism, in  
 14 order to see what can be saved therein. My goal is to assess a  
 15 potential legitimacy of a certain kind of holism or organicism,  
 16 which, I shall suggest, needs to steer clear of a variety of wrong-  
 17 headed, anti-naturalistic or otherwise excessively falsifiable an-  
 18 swers to the initial question. To borrow an expression from  
 19 Daniel Dennett, the issue is: *which varieties of organicism are 'worth*  
 20 *wanting'?* Since Scott Gilbert and Sahotra Sarkar's reflection on  
 21 the need for an 'umbrella' or 'organizing' concept to convey the  
 22 new vitality of systemic or holistic concepts in biology<sup>7</sup>, seconded  
 23 by Manfred Laubichler's paper proclaiming the return of the  
 24 'organism' as such an organizing concept<sup>8</sup>, some scholarly work  
 25 has been done which dispels earlier prejudices and gives us a  
 26 more useful, nuanced sense both of these concepts in biological  
 27 science and their possible pertinence today<sup>9</sup>.

<sup>6</sup> I'll refrain from using the potentially convenient two-letter acronym.

<sup>7</sup> S. GILBERT, S. SARKAR, *Embracing complexity: organicism for the 21<sup>st</sup> century*, «Developmental Dynamics», 219, 2000, pp. 1-9.

<sup>8</sup> M. LAUBICHLER, *The Organism is dead. Long live the organism!* «Perspectives on Science», 8 (3), 2000, pp. 286-315.

<sup>9</sup> See e.g. P. HUNEMAN, C.T. WOLFE (eds.), *The Concept of Organism: Historical, Philosophical, Scientific Perspectives*, special issue of *History and Philosophy of the Life Sciences*, 32 (2-3), 2010 and T. CHEUNG, *From the Organism of a Body to the Body of an Organism: occurrence and meaning of the word 'organism' from the seventeenth to the nineteenth centuries*, «British Journal of the History of Science», 39, 2006, 319-339, on the history and theory of organism.

1 In addition, there has been some sustained work on these  
2 concepts in current biology. To name three recent examples, (1)  
3 in theoretical biology, the effort to articulate a model of «orga-  
4 nized systems» and «organizational closure», in Alvaro Moreno  
5 and Matteo Mossio's research, alone or with collaborators<sup>10</sup>. A  
6 question arising in reaction to this research is the extent to which  
7 philosophically it is committed to a non-naturalistic concept of  
8 organism as organizing centre, as a foundational rather than  
9 heuristic concept – or possibly a «biochauvinism», to use Di  
10 Paolo's term<sup>11</sup>. He does not define it, but we can imagine that  
11 biochauvinism would be the present-day, naturalistic form of  
12 what was attacked by the Vienna Circle and others as vitalism: no  
13 longer the claim that there are immaterial vital forces which play a  
14 causal role in the functioning of living beings, but simply the  
15 claim that living beings, as distinct from tables, chairs and pro-  
16 tons, are ontologically specific, not to say special. This is not an  
17 essay devoted to the work of Moreno et al. but I will state right  
18 away that I find their work especially free of these more inflated  
19 metaphysical claims that are characteristic of other, comparable  
20 theorists (including Francisco Varela, Robert Rosen and Evan  
21 Thompson).

22 (2) In biochemistry, Kirschner et al.'s research paper in *Cell*  
23 (Kirschner et al. 2000) on what they called «molecular vitalism» :  
24 they suggested that, faced with the limitations of genomics, re-  
25 searchers should investigate what the authors «whimsically»  
26 termed the «vitalistic» properties of molecular, cellular, and organ-  
27 ismal function: «the organism has fashioned a very stable physiolo-  
28 gy and embryology [...] It is this robustness that suggested 'vital  
29 forces', and it is this robustness that we wish ultimately to under-

<sup>10</sup> M. MOSSIO, A MORENO, *Organisational closure in biological organisms*, «History and Philosophy of the Life Sciences», 32(2-3), 2010, pp. 269-288; A MORENO, M. MOSSIO, *Biological autonomy. A Philosophical and theoretical enquiry*, Springer, Dordrecht, forthcoming, and earlier, K. RUIZ-MIRAZO, A ETXEBERRIA, A MORENO, J. IBÁÑEZ, *Organisms and their place in biology*, «Theory Bioscience», 119, 2000, pp. 209-233.

<sup>11</sup> E. DI PAOLO, *Extended Life*, «Topoi», 28, 2009, p. 10.

1 stand in terms of chemistry. We will have such an opportunity in  
2 this new century»<sup>12</sup>.

3 (3) In evolutionary biology, Pepper and Herron's 2008 paper  
4 suggests that organisms define a category that evolutionary biolo-  
5 gy cannot do without, because it «relies heavily on the compar-  
6 ative method, and effective comparison requires that we first  
7 define a class of comparable entities», and they seek to articulate a  
8 «robust and general operational definition» of organism, which  
9 should distinguish between «which biological entities are organ-  
10 isms and which are not», particularly from *parts* of organisms and  
11 *groups* of organisms<sup>13</sup>.

12 The above examples indicate that different trends in biologi-  
13 cal theory are articulating – or calling for – an organism concept.  
14 However, only the first of these three cases directly contributes to  
15 an explicitly holistic and organismic framework, which is the main  
16 focus of this essay.

17 My aim is to conceptually clarify these forms of holism and  
18 organicism. I acknowledge that the study of early twentieth-  
19 century holisms indicates that not all of them were in fact 'organ-  
20 icist' or 'biologistic'. That is, some of the original forms of self-  
21 described holism (I am not speaking of purported holists who  
22 include such diverse figures as Spinoza, Hegel and Whitehead)  
23 were primarily interested in systems *as such*, although they waver  
24 on the issue, sometimes even seeking to derive principles *from*  
25 biological systems *for the understanding* of other systems, as in  
26 Walter Cannon's suggestion that

27  
28 It seems not impossible that the means employed by the more  
29 highly evolved animals for preserving uniform and stable their  
30 internal economy (i.e., for preserving homeostasis) may present  
31 some general principles for the establishment, regulation and  
32 control of steady states, that would be suggestive for other kinds

<sup>12</sup> M. KIRSCHNER, J GERHART, T. MITCHISON, *Molecular "Vitalism"*, «Cell», 100, 2000, p. 87.

<sup>13</sup> J. PEPPER, M. HERRON, *Does biology need an organism concept?*, pp. 625, 621. For more on the issue of 'what units do biologists count?' see the original article by E. CLARKE, *The Multiple Realizability of Biological Individuals*, «The Journal of Philosophy», CX (8), 2013, pp. 413-435.

1 of organization—even social and industrial—which suffer from  
2 distressing perturbations<sup>14</sup>.

3  
4 What is holism? As mentioned above, it is intimately bound  
5 up with systems theory, and with formally driven methods which  
6 sought to give a new kind of coherence to biology, although this  
7 ‘systems’ interest was not always specifically biological. The  
8 person often presented as the first theorist of holism, the South  
9 African segregationist statesman (and specialist of Walt Whitman)  
10 Jan Christiaan Smuts, as well as John von Neumann and Ludwig  
11 von Bertalanffy later, wavers between defining holism as a total  
12 systemic standpoint (with no particular reference to a special  
13 status for living entities) and holism as an approach or model  
14 which sheds particular light on embryology and how organisms  
15 are not mere machines (with reference to teleology and the “his-  
16 torical” or “learned” character of organisms).

17 Deliberately or inadvertently mirroring various other epi-  
18 sodes in the history of mechanistic and organismic theories (in-  
19 cluding the Leibniz-Stahl debate), these original holists also speci-  
20 fy abstract terms on which ‘merely mechanical aggregates’ are  
21 different from genuine wholes, including chemical compounds,  
22 and then specify that biological organisms are the exemplars of  
23 ‘creative wholes’, as Smuts calls them, i.e., wholes which create  
24 structures different from their constituents or parts<sup>15</sup>. Here I will  
25 not be concerned with holism as a general systems theory, but  
26 rather with holism/organicism as a claim to define what is unique  
27 in biological systems, i.e., a kind of biochauvinism.

28  
29

<sup>14</sup> W.B. CANNON, *The Wisdom of the Body* (1932), revised and expanded edition, Norton, New York, 1963, p. 25 (thanks to Yelda Nasifoglu for help with this reference).

<sup>15</sup> J.C. SMUTS, *Holism and Evolution* (1926), Sherman Oaks, CA, Sierra Sunrise Books, 1999, pp. 140–141. The best general analysis and reconstruction of holism and organicism in early twentieth-century biological thought is E. PETERSONS’ dissertation, *Finding Mind, Form, Organism, and Person in a Reductionist Age*, PhD, 2 vols., Program in History and Philosophy of Science, University of Notre Dame, 2010.

1 II. Two critical remarks on two strangely apposite pitfalls of  
2 holist-organicist theory:

3 (1) There is a strange appeal of Kantianism for these schools  
4 of thought, notably Varela's<sup>16</sup>. There is something deeply flawed  
5 in a procedure which invokes the authority of the Kantian 'pro-  
6 jective' approach to organisms<sup>17</sup> in order to assert a set of onto-  
7 logical specificities about organisms. First, because this is precise-  
8 ly what the Kantian regulative ideal concept was designed to  
9 avoid, in explicit contrast to what he would have called 'rational  
10 metaphysics'. To provide an empirical set of criteria for why  
11 living beings are special and to claim that this supports or is  
12 supported by a Kantian framework, is not a good idea if this  
13 framework explicitly rejects the idea of giving empirical defini-  
14 tions of organism, inasmuch as Kant's organism concept is ex-  
15 plicitly built around his notion of regulative ideal<sup>18</sup>. For Kant,  
16 organism is a «reflective» construct rather than a «constitutive»  
17 feature of reality, and reflective judgments are «incapable of  
18 justifying any objective assertions»<sup>19</sup>.

19 Second, because it is not clear in any case why it counts as an  
20 argument against 'mechanistic science' or 'reductionism' to simply  
21 produce a list of key definitory features of Life, most classically,  
22 self-preservation, self-reproduction, self-reparation, and self-  
23 regulation<sup>20</sup>, or in a more updated form, «reproduction, life-  
24 cycles, genetics, sex, developmental bottlenecks, germ-soma

<sup>16</sup> Instances of such confusions can be found in A. WEBER, F.J. VARELA, *Life after Kant: Natural purposes and the autopoietic foundations of biological individuality*. «Phenomenology and the Cognitive Sciences», 1, 2002, pp. 97-125; S. KAUFFMAN, G. LONGO, No Law Entails The Evolution Of The Biosphere, 2011, <http://lifeboat.com/blog/2011/07/no-law-entails-the-evolution-of-the-biosphere>; G. LONGO, M. MONTÉVIL, S. KAUFMAN, No entailing laws, but enablement in the evolution of the biosphere, 2012, <http://arxiv.org/pdf/1201.2069.pdf>

<sup>17</sup> P. HUNEMAN (ed.), *Understanding Purpose: Collected Essays on Kant and the Philosophy of Biology*, University of Rochester Press, North American Kant Society Publication Series, Rochester, 2007.

<sup>18</sup> I. KANT, *Critique of Judgment* (1790), tr. W. Pluhar, Hackett, Indianapolis, 1987, § 73, p. 276.

<sup>19</sup> I. KANT, *Critique of Judgment*, § 67, p. 259; § 73, p. 277.

<sup>20</sup> Cf. J. SCHLANGER, *Les métaphores de l'organisme*, Vrin, Paris, 1971, p. 14.



1 separation, policing mechanisms, spatial boundaries or contiguity,  
2 immune response, fitness maximization, cooperation and/or  
3 conflict, codispersal, adaptations, metabolic autonomy, and func-  
4 tional integration»<sup>21</sup> (but precisely, the list is neither absolute nor  
5 stable, which is why many thinkers, including prominent biolo-  
6 gists, have declared that «Life as such does not exist»<sup>22</sup>), including  
7 because mechanistic explanations have shown themselves to be  
8 far more flexible and capable of integrating inter-level relations  
9 than the depiction of them as taking apart systems into compo-  
10 nent parts and leaving them there like broken toys.

11 Another puzzling feature of these projects in theoretical bi-  
12 ology that invoke Kant but primarily seek to defend versions of  
13 self-organization, might be expressed as: why the need for phi-  
14 losophy? Why run the risk of lapsing into a kind of naïve, indeed  
15 precritical metaphysics of selfhood and interiority, or of anti-  
16 materialism? How could a working natural scientist take on board  
17 proclamations such as Thompson's: «Life is not physical in the  
18 standard materialist sense of purely external structure and func-  
19 tion. Life realizes a kind of interiority, the interiority of selfhood  
20 and sense-making. We accordingly need an expanded notion of  
21 the physical to account for the organism or living being»<sup>23</sup>? This  
22 opposition between materialism and interiority is reminiscent of  
23 post-Kantian denunciations of attempts to find the 'seat of the  
24 soul'. Further, here Thompson is calling for an expanded notion  
25 of the physical, but often these kinds of theories, as I discuss  
26 below, end up explicitly recommending that we disregard materi-  
27 ality altogether – ironically given the desire on the part of, e.g.,  
28 developmental systems theorists to move away from a disembod-  
29 ied understanding of biological information, towards a kind of  
30 vital materiality. More generally, if theoretical biology wants

<sup>21</sup> E. CLARKE, *The Multiple Realizability of Biological Individuals*, cit., p. 415.

<sup>22</sup> A. SZENT-GYÖRGI, *The Living State: With Observations on Cancer*, Academic Press, New York, 1972, p. 1 (thanks to Gil C. Santos for this reference).

<sup>23</sup> E. THOMPSON, *Mind in life: biology, phenomenology, and the sciences of mind*, Harvard University Press, Cambridge, Mass., 2007, p. 238. Would Thompson also endorse Hegel's assertion that «The spatiality of the organism has no truth whatsoever for the soul» (G.W.F. HEGEL, *Philosophy of Nature*, trans. A.V. Miller, Oxford University Press, Oxford, 1970, § 248Z, p. 18)?

1 organizational concepts, seeks to steer our attention away from  
 2 the sirens of genetic reductionism and the informational gene,  
 3 why should this entail being anti-materialists?) And I've noted  
 4 elsewhere<sup>24</sup> that I think the appeal of Moreno, Mossio et al. is that  
 5 they dispense with the somewhat foundationalist metaphysical  
 6 appeals of these other forms of holism.

7 (2) the problem of seeking to justifying the autonomy and/or  
 8 ontological uniqueness of Life, organisms, biological agents *in*  
 9 *terms of empirical criteria*, of a laundry list of properties of Life (from  
 10 the classic, self-preservation, self-reproduction, etc. as mentioned  
 11 above, to organizational closure, autonomy and so on).<sup>25</sup> As I  
 12 wrote a few years ago, one thinker's homeostasis will always end  
 13 up being another thinker's homeostat<sup>26</sup>; or, one theorist's dynam-  
 14 ic equilibrium of hearts, kidneys, termite mounds or chemotaxis  
 15 will always end up being another theorist's dynamic equilibrium  
 16 of storms or traffic jams. Not that all attempts to understand  
 17 such systems have to fall prey to the problems of a foundational  
 18 or otherwise ontologized empirical set of core criteria for Life:  
 19 Moreno and Mossio do not, as noted, and speaking of termite  
 20 mounds, when Turner presents them as a case of «embodied  
 21 homeostasis»<sup>27</sup>, he avoids these pitfalls since he does not *ontologize*  
 22 the property. The interaction between individual termites, and  
 23 between the termites and the termite mound, is a form of *organi-*  
 24 *zation* rather than a special *substance*, a point made brilliantly by the  
 25 systems theorist von Bertalanffy:

26  
 27 Organisms exhibit the properties of life not because of some  
 28 special peculiarity of these compounds, but on account of the  
 29 heterogeneous system into which these compounds are articu-

<sup>24</sup> C.T. WOLFE, *Do organisms have an ontological status?*, «History and Philosophy of the Life Sciences», 32 (2-3), 2010, pp. 195-232.

<sup>25</sup> For a more detailed, and sophisticated attempt to delineate a set of features of 'biological autonomy', see B. ROSSLENBROICH, *On the Origin of Autonomy – A new look at the major transitions in evolution*, Springer, Dordrecht, 2014.

<sup>26</sup> That is, one thinker's purportedly core biological feature can be artificially modeled by another. C.T. WOLFE, *Do organisms have an ontological status?*. Thanks to Olivier Surel for suggesting I clarify this.

<sup>27</sup> J.S. TURNER, *The Tinkerer's Accomplice: How Design Emerges From Life Itself*, Harvard University Press, Cambridge, Mass., 2007, p. 27.

lated. There is no “living substance” because the characteristic of life is the organization of substances<sup>28</sup>.

I note in passing, because that is a topic for a different paper, that one worthwhile holist-organicist strategy that does *not* invoke definitional properties of life (or barely), is Kurt Goldstein’s, in his suggestion that rather than say what is unique about the biological, we look to the *observer*: to be an organism is to have a *point of view* on organisms; one which produces intelligibility, which reveals organisms as meaning-producing beings<sup>29</sup>. This approach – which has Kantian antecedents – is further extended after Goldstein, by Georges Canguilhem.

Either way, waving lists of properties is a poor way to counter the power of reductionism. The reductionist can always reply, in Pierre Duhem’s words, that a body is «only *provisionally* simple; it has remained undecomposed until now, but tomorrow may yield to a new means of analysis»<sup>30</sup>.

III. Holism or organicism, if it seeks to ontologize or otherwise absolutize features of life (digestion, proprioception, intentionality ...) can run into some categorical problems, that is, category mistakes, but also the danger of making empirical claims to have identified absolute traits of life – à la Elsasser’s organismic laws, or Varela’s «autopoiesis is an explication of the autonomy of the living»<sup>31</sup>, or Thompson’s statement of what we might call the vulgate of biological holism, «parts arise from the whole. Part and whole co-emerge and mutually specify each other»<sup>32</sup>,

<sup>28</sup> L.V. BERTALLANFY, *Modern theories of development*, trans. J.H. Woodger, Oxford University Press, H. Milford, London, 1933, p. 48.

<sup>29</sup> J. STAROBINSKI, *L’idée d’organisme*, Centre de Documentation Universitaire/Collège philosophique, Paris, 1956. The field of biosemiotics tarries at the limit between this flexible, non-literal idea of organisms as meaning-makers or world-makers, and a more stubbornly literal program.

<sup>30</sup> P. DUHEM *Le mixte et la combinaison chimique. Essai sur l’évolution d’une idée* (1902); reprint, Fayard-Corpus, Paris 1985, p. 50.

<sup>31</sup> F. VARELA, *Autonomy and Autopoiesis*, in G. Roth and H. Schwegler, eds., *Self-Organizing Systems*, Campus Verlag, Frankfurt 1981, p. 14.

<sup>32</sup> E. THOMPSON, *Mind in life*, cit., p. 38.

1 itself not really an argument – which may in the end go up in  
 2 smoke, when it emerges that scientists cannot agree on a defini-  
 3 tion of life, and thus find it more helpful to eliminate the concept.  
 4 If the concept of Life is rejected, as in Albert Szent-György’s  
 5 «Life as such does not exist» or better-known, the partly per-  
 6 formative statement by François Jacob, «On n’interroge plus la  
 7 vie aujourd’hui dans les laboratoires»<sup>33</sup>, claims to have found its  
 8 essential characteristics lose their foundation.

9 Further, sometimes the (former and current) holist and or-  
 10 ganicist insistence on opposing the systems they lovingly study to  
 11 some apparently inferior opposed entity, whether matter itself,  
 12 machines, corpses or the dehumanized world of Scientific Revo-  
 13 lution science, starts to sound ideological rather than scientific or  
 14 philosophically exploratory, even when it is put in deceptively  
 15 plain terms, such as here in Alva Noë’s recent book *Out of our*  
 16 *heads*: «to do biology we need the resources to take up a non-  
 17 mechanistic attitude to the organism»<sup>34</sup>. What would the mecha-  
 18 nistic attitude be? That of Descartes (who wrote, «the preserva-  
 19 tion of health has always been the principal end of my studies»<sup>35</sup>)?  
 20 Of Claude Bernard (for whom «what distinguishes a living ma-  
 21 chine is not the nature of its physico-chemical properties, com-  
 22 plex as they may be, but rather the creation of the machine which  
 23 develops under our eyes in conditions proper to itself and accord-  
 24 ing to a definite idea which expresses the living being’s nature and  
 25 the very essence of life»<sup>36</sup>)? Of the contemporary ‘mechanist’  
 26 William Bechtel, for whom mechanism and organization stand in

<sup>33</sup> F. JACOB, *La logique du vivant*, Gallimard, Paris, 1970, p. 320. See the interesting reflections on this issue in Michel Morange’s review essay M. MORANGE *Un retour du vitalisme ?*, *Histoire de la recherche contemporaine* 2(2), 2013, pp. 150-155).

<sup>34</sup> A. NOË, *Out of Our Heads; Why You Are Not Your Brain, and Other Lessons from the Biology of Consciousness*, Farrar, Straus and Giroux, New York, 2009, p. 41.

<sup>35</sup> In a letter to the Marquess of Newcastle, October 1645, in R. DESCARTES, *Œuvres*, eds. C. Adam and P. Tannery, 11 vols., Vrin, Paris 1964-1976, vol. IV, p. 329; *The Philosophical Writings of Descartes*, vol. 3: *The correspondence*, trans. J. Cottingham, R. Stoothoff, D. Murdoch and A. Kenny, Cambridge University Press, Cambridge, 1985, p. 275.

<sup>36</sup> C. BERNARD, *An Introduction to the Study of Experimental Medicine* (1865), Henry Schuman, New York, 1927, p. 93.

1 a complex and fruitful interaction? Mechanism, Bechtel suggests,  
2 can provide an adequate account of organization by «placing as  
3 much emphasis on understanding the particular ways in which  
4 biological mechanisms are organized as it has on discovering the  
5 component parts» of the mechanisms and their operations»<sup>37</sup>. But  
6 this does not reduce to some pure mechanist ontology. In fact,  
7 the holist/organicist standpoint minimally «remind[s] mechanists  
8 of the shortfalls of the mechanistic accounts on offer», for ideas  
9 such as «negative feedback, self-organizing positive feedback, and  
10 cyclic organization are critical to explaining the phenomena  
11 exhibited by living organism»<sup>38</sup>.

12 I say *sometimes*, since biochauvinism, or some weaker form of  
13 it, need not be so ideological or oppositional. When it is not, it  
14 can be appealing as a stubbornly realist or materialist-friendly  
15 emphasis on genuine biological constraints. Consider the (some-  
16 what restrictive) opposition Andy Clark proposes, between two  
17 arguments for embodiment (and here for ‘embodiment’ we could  
18 substitute ‘biochauvinism’, ‘organismicity’, etc.):

19  
20 One of those strands depicts the body as special, and the fine  
21 details of a creature’s embodiment as a major constraint on the  
22 nature of its mind: a kind of new-wave body-centrism. The other  
23 depicts the body as just one element in a kind of equal-  
24 partners dance between brain, body and world, with the nature  
25 of the mind fixed by the overall balance thus achieved: a kind of  
26 extended functionalism (now with an even broader canvas for  
27 multiple realizability than ever before)<sup>39</sup>.

28  
29 I daresay most materialists except ones especially enamored  
30 of pure physics would want to say that «the fine details of a crea-  
31 ture’s embodiment» count as «a major constraint on the nature of  
32 its mind»; yet these fine details by no means imply that « the body

<sup>37</sup> W. BECHTEL, Biological mechanisms: Organized to maintain autonomy, in F. BOOGERD, F.J. BRUGGEMAN, J-H.S. HOFMEYER, AND H.V. WESTERHOFF (eds.), *Systems Biology: Philosophical Foundations*, Elsevier, Amsterdam, 2007, p. 270.

<sup>38</sup> Ivi, pp. 296-297.

<sup>39</sup> A. CLARCK, *Pressing the flesh: a tension in the study of the embodied embedded mind ?*, *Philos. Phenomenol. Res.*, 76(1), 2008, p. 56.

1 is special» in any way, especially not that of an embodied or  
 2 enactivist phenomenology founding itself on a claim of a founda-  
 3 tional interiority – recall, again, Thompson’s «Life is not physical  
 4 in the standard materialist sense of purely external structure and  
 5 function. Life realizes a kind of interiority, the interiority of  
 6 selfhood and sense-making», to which we can add Varela’s claim  
 7 in a late paper that his project is to «reintroduce the subject into  
 8 biology»<sup>40</sup>. Now, I am not rejecting as anti-naturalistic the latter  
 9 part of Thompson’s claim – namely, that organisms are engaged  
 10 in ‘sense-making’, an idea we could fill in either ‘biosemiotically’  
 11 (with Uexküll’s analysis of *Umwelt*, in which «even the simplest  
 12 living organism creates a set of preferential partitions of the  
 13 world, converting interactions with their surrounding media into  
 14 elementary norms or values, as we will explain more extensively  
 15 below. And here is where the nature of living systems as auton-  
 16 omous agents, as inventors of worlds with meaning, becomes  
 17 manifest»<sup>41</sup>) or in ‘constructivist’ terms, appealing to Kurt Gold-  
 18 stein’s idea that an organism, unlike a skeleton or a watch, is an  
 19 meaning-producing entity. But these attempts to integrate ‘sense-  
 20 making’ or ‘world-making’ into the province of biology have  
 21 *nothing* to do with appeals to «the interiority of selfhood» or a  
 22 «reintroduction of the subject into biology».

23 Selfhood or subjectivity is not a useful biological concept,  
 24 any more than the soul was a useful medical concept (thus in the  
 25 eighteenth century, the Montpellier vitalist physician Ménuret de  
 26 Chambaud could seek to ‘eliminate’ soul from medical discourse,  
 27 in an entry on «Death» in the *Encyclopédie*<sup>42</sup>). There is too much  
 28 reliance here on an appeal to interiority, as if it was an unchal-  
 29 lengeable philosophical concept. As Jean-Marie Schaeffer says,  
 30 «In phenomenology, the problematic of embodiment (*corporéité*) is  
 31 part of an approach that continues to accept the epistemic privi-

<sup>40</sup> A. WEBER, F.J. VARELA, *Life after Kant*, cit., p. 117.

<sup>41</sup> K. RUIZ-MIRAZO, A. MORENO, *Autonomy in evolution: from minimal to complex life*, Synthese, 185 (1), 2012, p. 28.

<sup>42</sup> J.-J. Menuret de Chambaud, *Mort*, «Encyclopédie», vol. X, Briasson, Paris, 1765, p. 718b.

1 lege of consciousness's self-investigation as axiomatic»<sup>43</sup>. From a  
2 naturalistic standpoint,

3  
4 there are no intrinsically subjective or perspectival facts that are  
5 either the special objects of self-regarding attitudes or facts of  
6 “what it is like”. There are only states of subjects that both  
7 function in a particularly intimate way within those subjects and  
8 have the subjects themselves and their other states as inevitable  
9 referents. And that is all there is to “subjectivity”<sup>44</sup>.

10  
11 No one prevents philosophers from meditating on the inner  
12 life, subjectivity or interiority. Thinkers from Augustine to Paul  
13 Ricoeur have done so brilliantly<sup>45</sup>. But again, not only is selfhood  
14 or interiority not a recognized biological concept; it is unclear  
15 how it could play even a heuristic role therein (as opposed, e.g.,  
16 to that of organization). To say it more positively, even if one is  
17 interested, not in living systems in general, but in ‘minded’ living  
18 systems, it remains the case that «things have a cognitive life  
19 because intelligence exists primarily as an enactive relation be-  
20 tween and among people and things, not as a within-intracranial  
21 representation»<sup>46</sup>. We are better off thinking in terms of relations,  
22 systems and interaction than in terms of a substantival life-force,  
23 selfhood or interiority. But focusing on relations and networks  
24 should not mean leaving out the materiality: «*system thinking* does  
25 not imply forgetting about the material mechanisms that are  
26 crucial to trigger off a biological type of phenomenon/behavior;

<sup>43</sup> J.-M. SCHAEFFER, *La fin de l'exception humaine*, Gallimard, Paris, 2007, p. 118.

<sup>44</sup> W.G. LYCAN, What is the ‘Subjectivity’ of the Mental? *Philosophical Perspectives* 4: *Action Theory and the Philosophy of Mind*, 1990, p. 126.

<sup>45</sup> For a critique, see C.T. WOLFE, «Éléments pour une théorie matérialiste du soi », in F. Pépin, ed., *La Circulation entre les savoirs au siècle des Lumières*, Hermann, Paris, 2011, pp. 123-149.

<sup>46</sup> L. MALAFOURIS, C. RENFREW (eds.), *The cognitive life of things: recasting the boundaries of the mind*, McDonald Institute for Archaeological Research Publications, Cambridge, 2008, Introduction, p. 4. One can also be more charitable to Thompson's enactivism, as he is not always unhappily insisting on a foundational interiority (what some would call ‘internalism’); he also describes living interiority as «compris[ing] the self-production of an inside that specifies an outside to which that inside is constitutively and normatively related» (E. THOMPSON, *Mind in life*, p. 225).

1 rather, it means putting the emphasis on the interactive processes  
 2 that make it up, that is, on the dynamic organization in which  
 3 biomolecules (or, rather, their precursors) actually get integrat-  
 4 ed»<sup>47</sup>.

5  
 6  
 7 IV. In sum, holism/organicism can succumb to two major  
 8 kinds of temptation: it can present itself as an empirical theory,  
 9 providing the key empirical characteristics of organisms, over and  
 10 against the rest of the natural world. Or, conversely, there is what  
 11 one might call the transcendental problem, in the sense of a  
 12 transcendentalizing of organism, or the flesh, or embodiment.  
 13 One can indeed be reluctant to conceive of the organism in  
 14 purely computational terms without invoking a mysticism of the  
 15 flesh (from Merleau-Ponty's appeals to transubstantiation in  
 16 seeking to highlight what is unique in the sensation of an embod-  
 17 ied being<sup>48</sup> to Thompson's denial that «life is physical in the  
 18 materialist sense»). Here, a third problem emerges: the addiction  
 19 to formalisms at the expense of materiality.

20 Faced with certain holistic excesses, I am not, to repeat, ad-  
 21 vocating the extreme prudence of instrumentalism, in which the  
 22 moral when it comes to the material realization of biological  
 23 systems might be 'handsome is as handsome does'. Contempo-  
 24 rary holists are often still potentially beholden to a certain kind of  
 25 vitalism or «biochauvinism»<sup>49</sup>; but when, out of extreme caution,

<sup>47</sup> K. RUIZ-MIRAZO, A. MORENO *Basic Autonomy as a Fundamental Step in the Synthesis of Life*. *Artificial Life*, 10, 2004, p. 238.

<sup>48</sup> «Just as the sacrament not only symbolizes . . . an operation of Grace, but is also the real presence of God . . . in the same way the sensible has not only a motor and vital significance but is nothing other than a way of being in the world that our body takes over [...] sensation is literally a communion » (M. MERLEAU-PONTY, *Phénoménologie de la perception*, Gallimard, Paris, 1945, p. 245).

<sup>49</sup> Again, this is not an essay in the historical epistemology of organisms, or a suggestion in how to rethink our presuppositions about vitalism, e.g. by revisiting its history. For some efforts in this direction, see C.T. WOLFE, *From substantial to functional vitalism and beyond, or from Stahlian animas to Canguilhemian attitudes*. *Eidos*, 14, 2011, pp. 212-235 ; S. NORMANDIN, C.T. WOLFE (eds.), *Vitalism and the scientific image in post-Enlightenment life science, 1800-2010*, Springer, Dordrecht, 2013.



1 they reduce their claims to mere heuristics, *conversely*, they risk  
2 losing sight of a certain kind of organizational «thickness», a  
3 «vital materiality» in Wheeler's terms<sup>50</sup>; he opposes vital to *imple-*  
4 *mentational* materiality, without really *fleshing* out the distinction, so  
5 to speak, but I assume it is similar to what an earlier, perhaps the  
6 first theorist of vital materiality, Denis Diderot, expressed in a  
7 nice metaphor: «What a difference there is, between a sensing,  
8 living watch and a golden, iron, silver or copper watch!»<sup>51</sup>.

9 If there was only implementational materiality, (i) we would  
10 fail to grasp any meaningful difference between a living watch  
11 and a silver or copper watch – and please note, this difference  
12 need not be justified in terms of a vital force, an entelechy, an *élan*  
13 *vital*, a centralizing soul or self, an irreducible intentionality or  
14 first-personness<sup>52</sup> – and (ii) we would lapse into a kind of lazy  
15 multiple realizability position<sup>53</sup> which disregards the material in  
16 which a system is realized, of the sort classically stated by Varela  
17 and later, Robert Rosen. Here is Varela:

18  
19 We are thus saying that what defines a machine's organization is  
20 relations, and hence that the organization of a machine has no  
21 connection with materiality, that is, with the properties of the  
22 components that define them as physical entities. In the organi-  
23 zation of a machine, materiality is implied but does not enter *per*  
24 *se*.<sup>54</sup>  
25

<sup>50</sup> M. WHEELER, *Mind, things and materiality*, in L. MALAFOURIS, C. RENFREW (eds.), *The cognitive life of things*, pp. 29-37.

<sup>51</sup> D. DIDEROT, *Éléments de physiologie*, in *Œuvres complètes*, dir. H. Dieckmann, J. Proust, J. Varloot, Éditions Hermann, Paris, 1975-, XVII, p. 335.

<sup>52</sup> Contra the Varela first-person business (e.g. F.J. VARELA, J. SHEAR, *First-person methodologies: why, when and how*, *Journal of Consciousness Studies*, 6(2-3) 1999, pp. 1-14).

<sup>53</sup> See the excellent history and analysis of multiple realizability arguments in J. BICKLE, *Multiple Realizability*. In E. ZALTA (ed.), *Stanford Encyclopedia of Philosophy*, <http://plato.stanford.edu/entries/multiple-realizability/>, 1998; updated 2013.

<sup>54</sup> F.J. VARELA, *Principles of Biological Autonomy*, Elsevier North Holland, New York, 1979, p. 9, cit. in W. BECHETEL, *Biological mechanisms, cit.*, p. 294. To be fair, in context Varela is not calling for multiple realizability, but it is not clear why or how he is not.

1 Using much the same language, Rosen describes his ap-  
 2 proach as «relational», which we might think of as congenial to  
 3 the study of specific biological forms of organization, but no: he  
 4 adds that the relational approach aims to «throw away the matter  
 5 and keep the underlying organization»<sup>55</sup>. This is like the central  
 6 dogma of functionalism, i.e., multiple realizability, by virtue of  
 7 which the materiality of systems is held to be irrelevant: as ex-  
 8 pressed classically by the arch-functionalism Hilary Putnam, «we  
 9 could be made of Swiss cheese and it wouldn't matter»<sup>56</sup>.

10 To conclude, there is something endearing about vitalist  
 11 claims especially when they *don't* invoke or rely on a foundational  
 12 subjectivity, *including* because they don't revert to explaining  
 13 biological systems (embodied agents) in fully systemic, formalized  
 14 terms. So is a small amount of biochauvinism acceptable, or even  
 15 desirable? If it means the effort to grasp the kind of vital material-  
 16 ity characteristic of biological systems – their organization, in the  
 17 language of Moreno, and also Bechtel, who, like Scott Turner,  
 18 invokes Claude Bernard as an important predecessor of this  
 19 view<sup>57</sup>. Recall that for Bernard, «In order to study the phenomena  
 20 pertaining to living beings and discover the laws that govern  
 21 them, it is not necessary to know the essence of life itself»<sup>58</sup>. We  
 22 could enlist Bernard in support of the view that an investigation  
 23 of vital materiality need not transcendentalize Life or organism.  
 24 But is this materiality «substance» or «organization»? It is not  
 25 quite a biochauvinism, or very weakly, because it does not posit a  
 26 vital substance, a foundational interiority or an absolute set of  
 27 criteria for Life: recall von Bertalanffy's observation, «There is no

<sup>55</sup> R. ROSEN, *Life Itself*, Columbia University Press, New York, 1991, p. 119; cf. «throwing away the physics and keeping the underlying organization» (p. 280).

<sup>56</sup> H. PUTNAM, Philosophy and our Mental Life, in Putnam, *Mind, Language, and Reality. Philosophical Papers*, vol. 2, Cambridge University Press, Cambridge, 1975, p. 291.

<sup>57</sup> J. S. TURNER, cit., chapter 2 (on Bernard machines); *idem*, Homeostasis and the forgotten vitalist roots of adaptation, in S. NORMANDIN, C.T. WOLFE (eds.), *Vitalism and the scientific image*, cit.

<sup>58</sup> C. BERNARD, *Histoire de l'expérimentation physiologique – l'art d'expérimenter sur les êtres vivants*, Revue des cours scientifiques de la France et de l'étranger, 6<sup>e</sup> année, Germer Baillière, Paris, 1869, p. 194.

1 “living substance” because the characteristic of life is the organi-  
2 zation of substances»<sup>59</sup>. However, as I’ve said earlier, a focus on  
3 organization and relations need not imply that we sacrifice its  
4 materiality in favour of ‘Swiss cheese’ multiple realizability. A  
5 biochauvinism implies a degree of ontological commitment (what  
6 I termed a «weakly ontological» view of organism in my earlier  
7 reflection on the topic<sup>60</sup>). A tangibility, implicit in what I above  
8 pointed to – that most materialists can accept a degree of embod-  
9 iment (a.k.a. biochauvinism), granting that facts about bodies can  
10 act as ‘major constraints’ on facts about minds. Yet this tangibil-  
11 ity, this embodiment appeal to no foundational interiority, no  
12 special inner life.

13 My suggestion then is that it should be possible to articulate  
14 a concept of biological holism or organicism (whether it is locat-  
15 ed in systems biology, theoretical biology, evolutionary biology or  
16 a philosophical reconstruction of several of these) which dispense  
17 with the first-person obsession or the transubstantiation-  
18 friendly invocation of an ontology of the body as *corps propre*,  
19 although this is not the same as Clark’s, Wheeler’s or Malafouris’  
20 attention to vital materiality. Such a view is neither an empirical,  
21 laundry list ‘biochauvinism’ nor a metaphysical ‘vitalism’.

22

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30

<sup>59</sup> L.V. BERTALLANFY, *Modern theories of development*, trans. J.H. Woodger, Oxford University Press, H. Milford, London, 1933, p. 48.

<sup>60</sup> C.T. WOLFE, *Do organisms have an ontological status?*, cit.