

# Chapter 6

## Does Organicism Really Need Organization?



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**Abstract** The main purpose of the present chapter is to argue in favor of the claim that, contrary to what is usually and tacitly assumed, organization is not necessary for organicism. To this purpose, I first set up the stage by providing a working characterization of organicism that involves two free parameters, whose variations allow for covering the rich and diverse conceptual landscape of organicism, past and present. In particular, I contend that organization is usually construed as a “mean to an end” notion, or as a tool put at the service of vindicating organicism’s twofold defining assumption, namely, that organisms are determinative entities in their own right, to the effect that (organismic) biology is epistemologically autonomous from physico-chemistry. After a short detour devoted to show that organicism generally collapses on a spectrum of variants of emergentism, I take inspiration from a recent account of emergence called “transformational emergence” to put forward a transformational version of organicism. For such a version meets organicism’s defining standards in a way that is free of any commitment to organization, arguing for its very conceptual soundness finally allows for legitimizing the claim that organicism doesn’t really need organization.

**Keywords** Organicism · Organization · Downward determination · Emergence · Diachronic emergence · Transformational emergence · Transformational organicism

### 6.1 Introduction

That biological entities are organized, and in a rather intricate way to be sure, is a somewhat bland and commonplace observation. Contrary to certain physical or chemical objects, like the solar system or methane molecules, it is uncontroversial that even the most elementary living entity – whatever it is – consists of an exquisitely complex web of spatially and temporally integrated interactions.

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As the editor of this volume indicated in his introduction, the history of biology is marked by a profound and recurring antagonism as to the exact significance and reach of such an observation. On the first side of this antagonism, we find those reductionist biologists or philosophers who tend to consider biological organization as a mere quantitative prolongation of the kind of structuring of matter and energy that can be found in the physicochemical world. According to them, living organisms just are particularly complex bundles of molecules, for which a proper scientific understanding should not in principle require a substantially different treatment from the one(s) already at stake in physics or chemistry – perhaps issues of computational power apart. On the opposing side of the antagonism, there is a (probably minority) community of thinkers who are rather willing to take biological organization *seriously*, as what essentially marks a dividing line between biological and physicochemical entities, as well as, incidentally, between the biological and the physicochemical sciences. These thinkers, regardless of their specific allegiances and in sharp contrast with their opponents of a reductionist temperament, share as a common rallying sign some specified measure of antireductionism, according to which “there is more in biological objects than physico-chemistry alone could ever tell.”

It goes without saying that organicism, a perspective on biology and biological objects that essentially grew as an articulated scientifico-philosophical doctrine in the early days of the twentieth century, is to be counted as a particular instance of such an antireductionist attitude toward biological organization. According to organicists indeed – and in a way that will of course be further explicated in this chapter – it is the very fact that biological entities are organized that constitutes the ultimate, empirical ground as to why one should conceive of the objects and/or the science of biology as unique and idiosyncratic.

In the present chapter, and perhaps a little bit provocatively I’m afraid, I would like to question what is often taken as self-evident, that is to say – and more particularly – I intend to scrutinize the apparently inexorable association of organicism with organization, by raising the following question: does organicism *really* need organization? Of course, for answering this question positively would not be that exciting, I plan to give it a (certainly more remarkable) negative response. So to put it bluntly – and before feeling the need to add a few rhetorical provisos – I’ll claim that organicism could actually stay true to its promises by *not* taking organization seriously, by playing the game, so to speak, of their lifelong, reductionist opponents.

As with any philosophical endeavor that proclaims itself provocative, it actually isn’t as much as it would like. From the outset, I must indeed temper my enthusiasm of setting the cat among the pigeons by explicitly disclosing what I will *not* claim in this chapter. So here it is. In this chapter, I will *not* claim that:<sup>1</sup>

- Organisms are not organized\*
- Organization\* doesn’t play a crucial role, explanatory or otherwise, in (organismic) biology
- Organization\* does not crucially participate in making organisms what they are

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<sup>1</sup> I use the categories of organism and organization\* here for reasons that will be clear from Sect. 2 onward. The reader can then come back here in due time to benefit from a quick reminder.

What this essentially amounts to is this: I will neither endorse nor try to argue for the idea that organicists (or any other biologist/philosopher with an antireductionist penchant) should downplay or neglect biological organization. Rather and more modestly, I'll simply claim that they *can*. The point of such a contention is that, should the reductionist side of biology's recurring antagonism finally have the upper hand, this would not necessarily mean the end of organicism and its uncompromising plea for an autonomous or irreducible biology.

Here is how I intend to structure the upcoming discussion. In Sect. 2, I first propose a general definition of organicism. In particular, after emphasizing the role that organization usually plays in organicism (Sect. 2.1), I'll articulate a characterization of the view in which organization appears as a free parameter (Sect. 2.2). I then turn to a discussion of the close relationship that organicism has with emergentism in Sect. 3. I'll first claim that organicism generally collapses on emergentism (Sect. 3.1) and then proceed by showing how a recent, nontraditional theory of emergence allows for defining a nontraditional, "transformational" version of organicism (Sect. 3.2). In Sect. 4, I'll then be in a position to provide an articulated answer to the core question of this chapter, by showing that such a transformational organicism, which eschews any serious commitment to organization, is conceptually sound (Sect. 4.1). As a bonus, I will provide some preliminary thoughts as to why one should consider transformational organicism as deserving further philosophical scrutiny (Sect. 4.2). I will finally address a possible objection to the whole endeavor of this chapter and use it as a stepping stone to point in the direction where future elaboration on transformational organicism should be made (Sect. 4.3).

## 6.2 When Is Organicism?

As a preliminary, I first set up the stage by formulating a general, working characterization of organicism that contains two free parameters. Varying both these parameters will allow for covering the very diverse conceptual landscape of organicist variants, past and present.

### 6.2.1 *Organization as a Mean to an End*

To this aim, I take inspiration from Nicholson and Gawne (2015)'s recent identification of three "general ideas" that are taken to "unite" the different trends of organicism. These ideas – organism, autonomy, and organization – together with the conceptual connections between them can be explicated as follows:<sup>2</sup>

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<sup>2</sup>Most of the quotations in this section are directly extracted from Nicholson and Gawne's paper, even if, for the sake of proper reference, I only mentioned their actual origin. The way in which the three tenets are presented and organized is my own.

- *Organism* – It is a recurring theme among organicists that living organisms are idiosyncratic entities. As such, they are supposed to possess some unique (set of) trait(s) that allows for unambiguously distinguishing them from other, non-organismic entities like molecules, stones, or stars. Typically, organisms are considered peculiar in that they are – contrary to molecules, stones, or stars – “unified wholes” that are “more than the sum of their parts.” Although this traditional, holistic idea can be given very different interpretations, there seems to be a widespread tendency in organicism to read it in *determinative* terms. In a nutshell: organisms are idiosyncratic wholes to the extent that they are determinative *in their own right*. Put differently, organisms are those united wholes that happen to be determinatively effective *qua* wholes, that is, not only insofar as they are made of underlying entities – cells, molecules, atoms, or ultimately, non-composite physical units – that are themselves determinative. A typical way of making sense of such an overarching determinative effectiveness of organisms is to consider that organisms are the kind of entities that are able to “make a difference” as to how their own constitutive parts behave. In the words of notorious organicists: “The whole enters always into the determination of the activities of the parts” (Woodger, 1929, 247); or “the behaviour of an isolated part is [...] different from its behaviour within the context of the whole” (von Bertalanffy, 1952, 12).
- *Autonomy* – A second core tenet of any particular variant of organicism is the relentless contention that the biological sciences – broadly understood as, among other things, the scientific study of organisms – are autonomous from, or irreducible to, the physical sciences. There are many different ways in which such an autonomy or irreducibility can be precisely construed, depending on one’s preferred view about the general nature, goals, and methods of science. These can range from, for instance, the inability to adequately *represent* biological phenomena through the formal machinery of physics to the inability to *deduce* biological laws – if any – from physical laws plus some other assumptions. Perhaps the most widespread way of capturing the putative autonomy of biology is the one that directly pertains to explanation, i.e., biology would be an autonomous discipline insofar as they are biological phenomena out there that cannot be properly *explained* from the exclusive vantage point of physics.<sup>3</sup> As Haldane evocatively put it: “[t]hose who aim at physico-chemical explanations of life are simply running their heads at a stone wall, and can only expect sore heads as a consequence” (1908, 696).

It is noteworthy that both these first ideas – organism and autonomy – are not conceptually independent. If one is ready to take seriously the claim according to which “[a]ll of the organicists shared the conviction that the distinctiveness of organisms demanded a unique set of theoretical tools for their elucidation” (Nicholson & Gawne, 2015, 366), it then appears that the idea of organism is what

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<sup>3</sup>Although this is a generic way in which the tenet of autonomy will be broadly construed here, it is by no means the only one possible. For different takes on the issue, see, e.g., Moreno and Mossio (2015) or Varela (1979).

enforces, entails, or grounds the idea of autonomy. It is indeed essentially *because organisms are the way they are* – unified whole that are determinative in their own right – that the science that studies them, biology, happens to be autonomous from the science that study their constitutive parts, physics (or chemistry). As it were, it seems that “[b]iology must retain the courage of its own insights into living nature” (Weiss, 1969, 400).

- *Organization* – The third and last core ingredient that should be definable of organicism is the rather commonsensical idea that organisms are organized entities. Obviously, for such an idea not to be overly trivial, or for it to be of any philosophical significance, it has to be considerably sharpened and refined (as it is uncontroversial that molecules, stones, and stars *also* are, to some extent, organized entities, and not mere unstructured clusters of elementary physical units). Because it is not the place to speculate about how exactly one should achieve this sharpening or refinement, that is, how one should precisely conceive of the idiosyncrasy of organismic organization, let’s imagine that such a sharpening is possible, and let’s refer to its result as “organization\*.” Under this hypothesis, organization\* just is the kind of organization that is typical of organisms. As such, it allows for unambiguously distinguishing organisms from other organized – though not organized\* – entities like molecules, stones, and stars.

As with the two first ideas of organism and autonomy, the third tenet of organization is not conceptually freestanding. Rather, organization must essentially be taken as a *mean to an end*, that is, as a tool that supports the organicists’ main contention that organisms are unique entities that require an autonomous science to be dealt with. As things stand, “organisms are what they are by virtue of their organization[\*]” (Nicholson & Gawne, 2015, 364). That is to say, organisms are (supposed to be) determinative entities in their own right, precisely in virtue of the fact that they happen to be the kind of entities that are organized in a very idiosyncratic way, i.e., they are organized\*. In the words of contemporary organicists: “The principle of organization states that biological systems realize a closure of constraints. The organization of constraints realizing closure achieves a form of ‘self-determination’” (Mossio et al., 2016, 7). As it appears, it is assumed here that the unique determinative dynamics of organisms – referred to as “self-determination” – turns out to be brought about by the realization of a unique mode of organization, here a “closure of constraints.”<sup>4</sup>

This being said, I am now in a position to fully articulate Nicholson and Gawne’s three unifying ideas in order to provide a general, working characterization of organicism.

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<sup>4</sup>It should be noted that organicists – on the model of those quoted here – don’t necessarily restrict themselves to considering *organisms* as organized\*. More generally, they are often open to extending the scope of organization\* to the broader category of “biological systems.”

### 6.2.2 Defining Organicism

Here is a first attempt, formulated as a claim  $[O^o]$ , that any organicist, and organicists only, should take as true:<sup>5</sup>

$[O^o]$  – Organization\* makes organisms what they are – determinative entities in their own right. That organisms are such makes biology an autonomous science.

Of course, presented like this, organicism is nothing but a speculative philosophical view (hence the superscript “ $o$ ”). Should one want it to have some actual bearing on science – something that I suspect most, if not all, organicists certainly want – then the following companion claim is also to be endorsed (with the superscript “ $em$ ” standing for “empirical”):

$[O^{em}]$  – There is some restricted class of entities in nature, namely, organisms, that are organized\*.

In order to generalize this twofold characterization of organicism, three preliminary remarks are in order.

First, it should be noted that the three defining ingredients of organicism are associated with claims that are not on equal footing. In particular, the tenet of organicism is associated with a claim – “organisms are determinative entities in their own right” – that is *ontological* (*modulo* a proviso to be found below); the idea of autonomy comes with a contention – “biology is autonomous from physics” – that is essentially *epistemological*; and the claim that corresponds to the tenet of organization – “organisms are organized\*” – turns out to be *empirical*. By being committed to  $[O^o]$  and  $[O^{em}]$ , the argumentative structure of organicism is then rather sound, as well as, incidentally, quite widespread in the philosophy of science literature. It consists in identifying a class of entities in nature that appear to share a very special feature, for then extracting some putative metaphysical consequences therefrom, which are believed to have some impact on our way of doing science.

Second, thesis  $[O^o]$  may appear at first glance as overly restrictive, to the effect that, from the outset, some strands of organicism would be excluded from its scope. More particularly, I wouldn’t be surprised if some organicists considered the requirement that organisms are determinatively effective in their own right as being too ontological, hence inconsistent with the supposedly *exclusively* epistemological version of organicism they want to promote. I think this hypothetical concern is misguided for two interrelated reasons. The first is that, in a nutshell, it is really far-fetched to consider that there could be versions of organicism that are free of *any* ontological commitment, no matter how thin. As I take it, organicism at least endorses the idea that organisms do exist as “wholes” of a somehow *unique* kind, to the effect that there is a principled way in which they can be classified in a separate category from non-organismic things. “[A]fter all, [and contrary to stones and stars,] organisms are not just heaps of molecules” (Weiss, 1969, 400). Organicism then

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<sup>5</sup>The (certainly) ambiguous and polysemic notion of “determination” employed here will be unpacked below.

generally comes with some appetite toward an (at least very shallow) “ontologization” of organisms, or some minor degree of “biochauvinism” (Wolfe, [this volume](#)).<sup>6</sup> Without it, biology’s irreducibility would lack its main rationale and appear accordingly as exquisitely gratuitous. Should it indeed turn out that organisms just are “the sum of their parts,” on the model of – as the story goes – molecules, stones, or stars, then one could justifiably wonder why biology’s relation to physics should be *that* different from the other special sciences, like chemistry, geology, or astrophysics. This brings us to the second, related reason: as such, the very notion of “determination” is in itself highly noncommittal. This is of course why I opted for this term to begin with: determination denotes a neutral relation that can come with various intensities of ontological oomph, ranging from “thin” to “meaty” ones (Beebe, 2000). The “only epistemological organicists” can then rejoice, for, perhaps contrary to appearances, they have not been left ignored. Among the possible interpretations of the idea of determination that appears in the proposed definition of the view, the first of the following should actually satisfy them:

- Ontologically thin organicism:  
*Logical* determination – Organisms are determinative in the sense that facts about them entail facts about their parts (to the effect that the deduction/explanation of some facts about parts requires knowledge of some facts about organisms).
- Ontologically modest organicism:  
*Noncausal* determination – Organisms are determinative in the sense that they noncausally make a difference as to how their parts behave (e.g., organisms constrain the way in which their parts behave).
- Ontologically meaty organicism:  
*Causal* determination – Organisms are determinative in the sense that they contribute in bringing about their parts’ behavior (e.g., organisms possess irreducible causal powers and exercise them for making their parts behave in certain ways).<sup>7</sup>

Third and finally, the core question to be addressed in this chapter – “does organicism really need organization?” – requires us to seriously ponder the hypothesis, *pace* Nicholson and Gawne, that organization\* be *not* an integral part of organicism’s very *definiens* (otherwise this would simply beg the question at hand). The (organicist) reader is then kindly asked to at least leave open the possibility that the concepts of organicism and organization\* are not analytically connected (so organicism is not to be defined as the claim that organisms are organized\*).

With these preliminaries, I can now propose a revised version of the aforementioned characterization of organicism, on the following model:

<sup>6</sup>The term itself comes from Di Paolo, E. (2009). *Extended Life*. *Topoi*, 28, 9–21.

<sup>7</sup>For the sake of simplicity, I consider causation as a monolithic concept here, which reduces to “efficient causation” as construed under the compulsion of a productive account (e.g., Dowe’s (2000) transfer theory). Accordingly, possible alternative forms of causation – typically “formal causation” – are here considered noncausal. This choice is purely terminological and should therefore not afflict too much causal realists with an Aristotelian penchant.



[O<sup>o</sup>] – X makes organisms what they are – determinative<sup>y</sup> entities in their own right. That organisms are such makes biology an autonomous science.

And:

[O<sup>m</sup>] – There is some restricted class of entities in nature, namely, organisms, that have X.

As it appears, this definition involves two free parameters, X and Y. While the former is meant to cover scientifically kosher empirical means – among which organization\* certainly occupies a prominent place – that would be conducing to the uniqueness of organisms, the latter fixes the strength of the ontological oomph one wants to give to the view – respectively thin, modest, or meaty.

In the light of such a characterization of organicism, the main question that will keep us busy here is the following: for all possible values of Y, is it possible to vindicate the truth of [O<sup>o</sup>] without considering X as some variant of organization\*? In other words, is there a viable, empirical mean different from organization\* that organicists could exploit in order to ground the uniqueness of organisms and, with it, the autonomy of biology? In order to address this question and, more particularly, to answer it positively, it is necessary beforehand to make a short detour.

## 6.3 Organicism and Emergence

The main goal of this section is to show that the varieties of organicism as defined through [O<sup>o</sup>] collapse to a spectrum of emergentist positions. Put differently, I'll argue that, in order to live up to its promises, organicism necessarily has to be committed to some nontrivial form of emergence. This claim will not be defended here for mere informational purposes (though it may have some interest for that sake). Rather, it will open the door for exploiting some recent resources of the emergence debate, which will turn out to be helpful for addressing the central question of this chapter.

### 6.3.1 *Emergence and Organization\**

In and of itself, emergence is a very general and uninformative concept. In a nutshell, it captures any kind of relation between two *relata*, usually referred to as an “emergent” and its “emergence basis,” such that the emergent *depends on*, is *grounded in*, or *arises from* its basis, and yet, in spite of such a dependence, the former is also to be considered *autonomous from*, *novel with regard to*, or *irreducible to* the latter (see, e.g., Sartenaer (2016)). Of course, these ideas of dependence and autonomy are (i) very vague and (ii) mutually conflicting, to the effect that emergence is a notoriously ambiguous and unstable idea. Accordingly, putting it to



philosophical work previously requires (i) clarifying these ideas in a way that (ii) they are rendered compatible.

That organisms are emergent entities is not a new idea. Actually, it has been explicitly endorsed by the founding fathers of emergentism themselves.<sup>8</sup> For instance, in the words of Lloyd Morgan:

What emerges at any given level affords an instance of what I speak of as a new kind of relatedness of which there are no instances at lower levels (1923, 15–16); and:

I accept with natural piety the evidence that there is more in the events that occur in the living organism than can adequately be interpreted in terms of physics and chemistry, though physico-chemical events are always involved. Changes occur in the organism when vital relatedness is present the like of which do not occur when life is absent. This relatedness is therefore effective (1923, 20–21).

There is much to unpack in these quotes, though it is not the place to do it extensively here. Suffice it to emphasize that, according to the characterization put forward in Sect. 2, Morgan's emergentism could be seen as an organicism of some sort, as for him the empirical realization of some kind of organization\* – “vital relatedness” – is what renders organisms determinatively effective, to the effect that they cannot be “adequately interpreted” in physicochemical terms only.<sup>9</sup>

Apart from any particular historical episode, three features make organicism generally collapse on emergentism. The first – which is actually sufficient in itself – is an obvious definitional convergence. That organisms are determinatively effective in their own right make them somehow autonomous from their parts – logically, noncausally or causally, according to one's preferred version of the view – parts on which they are also supposed to depend. Second, organisms are ultimately to be considered determinatively effective and emergent because of organization\*. More particularly, it actually is some *reification* of organization that provides the necessary ontological oomph for both views to get off the ground. As organicists and emergentists alike would put it, respectively:

In essence, organization has become a *thing* (Rosen, 1991, 117; emphasis in the original); or:

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<sup>8</sup>Although emergentism has some deeper historical roots, one usually considers that the first, fully-articulated defense of the doctrine appeared around the 1920s, mainly in the combined works of philosophers and biologists (see, e.g., Blitz (1992)). Apart from George Henry Lewes who coined the term “emergence” in 1875, the first systematic, philosophical use of the concept is to be found in Lloyd Morgan's works. Other notorious early emergentists were Samuel Alexander, Roy Wood Sellars, and Charlie Broad.

<sup>9</sup>True, Morgan's position could also be considered as a (monistic) form of vitalism (Sartenaer, 2013), for (i) it is arguable that a “vital relatedness” that needs to be accepted with “natural piety” is not a scientifically kosher mean to vindicate the uniqueness of organisms, or (ii) such a view requires to be committed to the existence of nonphysical, “configurational forces” (McLaughlin, 1992). As it will appear below, I do not intend to fight over this point, which ultimately hangs upon the boundary between meaty organicism and materialism-friendly vitalism being somewhat blurry. In emergentist terms to be explicated below, one generally considers that Morgan was endorsing a “strong” form of emergence.

All through the argument of this book, we have proclaimed the *reality* of form (Sellars, 1922, 329; emphasis is mine).

Third, it is this very ontologization of organization that provides both views with the opportunity to occupy the conceptual space between reductive physicalism – “no ontological oomph” – and hard-nosed vitalism, “too much ontological oomph” – allowing for a reconciliation between some degree of antireductionism and the naturalistic demands of modern science. As it appears, both organicism and emergentism then conceive of organization\* as the very key to their commonly targeted “third way.” Besides the intrinsic determinativeness of physical entities themselves, with organization\* becomes available indeed an alternative, scientifically legitimate source of determinative effectiveness in the world – *contra* reductive physicalism – source which has nothing to do with the putative determinative potency that a separate realm of nonphysical entities would have intrinsically, *contra* (substantial) vitalism.

Table 6.1 summarizes this collapsing of organicism on emergentism along the possible variations of the parameter Y, X being fixed on organization.\* It should be noted that, whereas every possible variety of organicism amounts to a particular declination of emergentism, the converse is not true. This is unsurprising, given the very high generality of emergence, together with the fact that most traditional emergentists, including Morgan, were considering natural entities other than organisms as putative candidates for emergence (for instance, the products of chemical reactions or, typically, mental and conscious states).

Table 6.1 calls for some comments. First, a relatively peripheral one: given that both organicism and emergentism are usually formulated within the framework of a layered ontology of “levels,” where an organism is supposed to occupy a higher level than its underlying, lower-level parts, the determination that is at stake is generally to be considered “downward,” that is, oriented *from* the higher level of the whole *to* the lower level of the parts. This is why, though varieties of downward determination are typically coextensive with emergence – the most widespread being so-called downward causation (see, e.g., Kim (2006)) – they are also pervasive in organicists’ debates.<sup>10</sup>

Second, the reader should not be startled by the diversity of concepts of emergence referred to in the table. Weak and strong (ontological) emergences are actually commonplace in the literature (see, for instance, Wilson (2015)). They are usually distinguished in that the second entail, while the first doesn’t, the coming into being of new higher-level causal powers, something which makes the second, though not the first, inconsistent with physicalism (in the minimalist sense according to which “all worldly causal powers are physical”). “Modest emergence” is certainly more unusual and is here only meant as a label to paste on any account of emergence that would allow for

<sup>10</sup> See, e.g., Arnellos and El-Hani (2018), where the authors construe modest determination under the category of “medium downward causation” (to be contrasted with “strong downward causation,” following Emmeche et al. (2000)). This prevalence notwithstanding, it should be noted that some recent works in the organicist tradition *do* eschew any commitment to the idea of downward determination as construed here (see, e.g., Mossio et al. (2013)).

**Table 6.1** Varieties of organicism along dimension Y, together with the type of emergence they are committed to

Organicism	Determination (Y)	Emergence	Physicalism
Thin	Logical	Weak	Yes
Modest	Non-causal	Modest	Yes?
Meaty	Causal	Strong	No

reconciling physicalism with a decent measure of ontological antireductionism – something that, notwithstanding claims to the contrary, has still to this day not been achieved uncontroversially (I take this as an open endeavor whose fruitfulness has, in any case, no bearing on my current objective).

Third and finally, though I’m certainly sympathetic to the idea that nothing should in principle prevent us from considering meaty organicism as a genuine variant of the view, I also don’t have any good reason to contest the widespread idea that this looks “dangerously too much like vitalism” to deserve being properly named organicism – Lloyd Morgan’s strong emergentism being a vivid illustration of such an uncomfortable borderline situation. Accordingly, and in order not to raise unnecessary matters of controversy, I would be ready to leave aside meaty organicism/strong emergentism/monistic vitalism out of the scope of “respectable” organicism.<sup>11</sup>

It is now time to close this section by putting forward a third formulation of the characterization of organicism, in the light of what has been just said. Here it goes (with [O<sup>em</sup>] remaining unchanged):

[O\*] – X makes organisms emerge<sup>y</sup> from a physical basis. That organisms emerge<sup>y</sup> makes biology an autonomous science.

Parameter Y now corresponds to possible variations as to the kind of emergence involved. My central question then becomes: is there an empirical mean different from organization\* that would be conducing to emergence<sup>y</sup>? As it turns out, recent works on emergence can be called to support the claim that there is.

6.3.2 Emergence and Transformation

Since its very inception in the 1920s, emergence has been almost exclusively construed and discussed with, in the background, two interrelated assumptions. The first is that the dependence relation that connects an emergent to its basis is to be considered *synchronic*, that is, it is assumed to obtain between the putative emergent and its basis as they are instantiated at the very same time. The second is that emergence is an intrinsically *hierarchical* relation that connects lower-level to higher-level entities. Both these assumptions are implicit in the traditional organicist/

<sup>11</sup> For a finer-grained analysis of the relationship between organicism, emergentism, and vitalism, the reader can refer to Sartenaer (2018a). See also Wolfe (2011).

emergentist slogan, according to which “the (higher-level) whole is more than the sum of its (simultaneous, lower-level) parts.”

Yet, recent developments have shown that there actually exists a bona fide (family of) concept(s) of emergence that is free of both these assumptions and which is referred to as “transformational emergence” (Humphreys, 2016; Guay & Sartenaer, 2016; Guay & Sartenaer, 2018).<sup>12</sup> In contrast with traditional emergence, transformational emergence is *diachronic*, the putative emergent being typically instantiated later than its emergence basis, and *not hierarchical*, both the emergent and the basis belonging to the same level. What matters for us here is that, as its name suggests, transformational emergence is not driven by organization\*, but rather by transformation. In a nutshell, the uniqueness or distinctiveness of emergents doesn’t come about because unchanging entities are organized\* in a very idiosyncratic way. Rather, it comes about because these entities themselves are *transformed* in a very idiosyncratic way.

Let us illustrate the contrast that is at stake here by considering the case of a putatively emergent organism.<sup>13</sup> In the traditional perspective, an organism at time  $t$  emerges from a basis made of cells at  $t$ , for the organism is considered both dependent on and autonomous from these cells. For instance, in the ontologically modest declination of organicism, one could argue that the organism at  $t$  is constituted by its cells at  $t$  and that the former is able to downwardly constraint the behavior of these cells at  $t$ . In this first perspective, that the organism is able to do so proceeds from the fact that the organism is an organization\* of its constitutive cells.

Things are different in the transformational perspective. It is indeed rather considered there that an emergent organism at  $t$  both depends on, and is autonomous from, a basis made of cells at a previous time  $t'$ . For example, it could be contented that the organism at  $t$  is causally or nomologically dependent on the cells at  $t'$  and that the former exercises at  $t$  causal powers that are different from any combination of the causal powers that the cells had at  $t'$ . In this second speculative scenario, that the organism has new causal powers at  $t$  proceeds from the fact that the cells that make it up at  $t$  are ontologically different from the cells at  $t'$ , for the latter have been properly transformed. As it appears, the organism at  $t$  is nothing “over and above” a sum of cells at  $t$  – it actually is a mere organization, and not an organization\*, of these cells at  $t$  – though it is ontologically distinct from any sum of cells at  $t'$ . Under the form of a slogan: with transformational emergence, “the whole just is the sum of the parts that have been transformed.” It is noteworthy that, in such a view, the

<sup>12</sup> Of course, these developments have some historical precedents, among which Humphreys (1997)’s own “fusion emergence.” Epistemological variants of transformational emergence have also been proposed, for instance, by Bedau (1997) or Rueger (2000). Despite the fact that “transformational emergence” is a label that is sometimes used interchangeably with the one of “diachronic emergence,” I will stick here to the convention that consists in considering transformational emergence as a subspecies of diachronic emergence, which has the peculiarity of being flat and ontological.

<sup>13</sup> Just to be clear: I do not offer here the slightest argument to support the claim that organisms are in fact emergent (synchronously or transformationally).

**Table 6.2** Varieties of organicism along both dimensions X and Y, together with the type of emergence they are committed to. “S” and “D” subscripts stand for “synchronic” and “diachronic,” to the effect that the corresponding causal determination is to be considered downward and flat, respectively

X	Organicism	Determination (Y)	Emergence	Physicalism
Org.*	Thin	Logical	Weak	Yes
	Modest	Non-causal	Modest	Yes?
	Meaty	Causal	Strong <sub>s</sub>	No
Transf.	Transf.	Causal	Strong <sub>D</sub>	Yes

organism and the sum of the transformed cells are one and the same thing, to the effect that the emergence at stake is “flat” or nonhierarchical.

Now, should organisms be transformationally emergent entities, their determinative effectiveness would be of a causal nature. As a result, the emergence at play could be considered as “strong,” according to the terminological convention adopted above. Yet, it is important to emphasize that such a strong emergence would not be inconsistent with physicalism, to the extent that, in a diachronic and flat scenario, the newly acquired causal powers are unambiguously physical (for the physical level is the only level there is)<sup>14</sup>. Accordingly, and in contrast with the corresponding synchronic scenario, the very idea of transformationally emergent organisms – though strong – doesn’t encounter the risk of any detrimental acquaintance with putatively disreputable forms of vitalism.

Table 6.2 summarizes the upshot of this discussion. “Transformational organicism” just is the view according to which [O<sup>o</sup>] and [O<sup>em</sup>] come out as true when X is fixed on transformation rather than on organization\*.

At this stage of the discussion, answering the main question of this chapter requires a last step, which is to be taken in the next, last section. It only remains to be shown that transformation is a legitimate scientific process, which indeed leads to transformational emergents being (causally) determinative in their own right.

6.4 Transformational Organicism and the Autonomy of Biology

This last section, at the term of which I’ll finally be able to answer the question I started with, is structured in two moments. First, I’ll show that transformational emergentism is a conceptually viable view – both in general and, in particular, in its organicist declination – to the extent that there is at least one proper construal of transformation that does the job of securing the irreducible determinative

<sup>14</sup> For more detail on that point, see Sartenaer (2018b). In a nutshell, transformational emergence is immune to Kim-style exclusion arguments and, as such, allows for consistently combining in a same package causal irreducibility and the causal closure of the physical world.

effectiveness of transformational emergents and, in so doing, grounding the autonomy of the science that study them. In and of itself, this first endeavor is sufficient to answer my main question, whose nature is essentially conceptual. Second and as a bonus, I will briefly explore the idea that there could well be transformational emergents at stake in organismic biology, consistently with claims made by organicists themselves.

### 6.4.1 *Transformational Organicism Is Conceptually Sound*

In order to support the claim that transformational organicism is a conceptually viable view, I offer here what essentially amounts to an argument by analogy.

Let us suppose that “condensalism” is a view that is conceptually analogous to organicism, the chauvinist claim of uniqueness being merely shifted from organisms to condensed materials. Coherently with the previous discussion, a possible twofold definition of condensalism would thus be as follows:

[C<sup>o</sup>] – X makes (some) condensed matter emerge<sup>Y</sup> from a physical basis, that is, it makes (some) condensed matter what it is – a determinative<sup>Y</sup> entity in its own right. That (some) condensed matter is such makes condensed matter physics an autonomous science.

And:

[C<sup>em</sup>] – There is some restricted class of entities in nature, namely, (some) condensed matter, that has X.

In what follows, I argue that there is a suitable, scientifically kosher transformation X that makes both [C<sup>o</sup>] and [C<sup>em</sup>] true, with Y being then fixed on transformational or strong<sub>D</sub> emergence, or, equivalently, “flat” causal determination. On this basis, I then simply exploit the hypothesized conceptual analogy to support the truth of the following claim:

[O<sup>o</sup>] – Transformation makes organisms transformationally emergent from a physical basis, that is, it makes organisms what they are – (causally) determinative entities in their own right. That organisms are such makes biology an autonomous science.

At this stage, my main objective will be met: organization\*, and organization a fortiori, will have been shown not to be necessary for organicism. As an extra, I’ll also propose some further considerations in the next section that will provide some preliminary reasons to also take as true the further, empirical claim:

[O<sup>em</sup>] – There is some restricted class of entities in nature, namely, organisms, that are the product of a transformation.

This being said, I now turn to providing support for the truth of [C<sup>o</sup>] and [C<sup>em</sup>], with X being fixed on transformation. For this purpose, I here exploit the results of some previous works, in which the emergentist position of a prominent figure in

contemporary physics, namely, the 1999 Nobel Prize winner Robert Laughlin, has been philosophically reconstructed in a transformational perspective (Guay & Sartenaer, 2016; Guay & Sartenaer, 2018). In a nutshell, what has been shown there is that the organicist's general methodology, as described in Sect. 2.2, can also be found at play in the debate that pertains to the putative reducibility of condensed matter physics to particle physics. More particularly, it is possible to argue that the physics of some worldly phenomena supports the following argumentative schema: there is transformational emergence in condensed matter physics (empirical claim). Therefore, condensed matter is determinative (*qua* condensed matter; ontological claim). Therefore, condensed matter physics is autonomous from particle physics (epistemological claim).

It is not the place here to extensively develop the way in which such an argumentative structure can be uphold (the interested reader is kindly asked to look into the relevant papers for more detail). I content myself with highlighting its most relevant steps:

- There is a well-documented phenomenon in physics, called the quantum Hall effect, that occurs when some piece of conductor, in which an electric current flows, is placed in a strong, orthogonal magnetic field at very low temperature. The effect in question manifests itself through the existence of plateaus of constant Hall resistance (associated with the transverse current induced), which occur for certain values of the applied magnetic field. These plateaus can be ordered according to a certain filling factor, which can take either integer values only – we then speak of the “integer quantum Hall effect” [IQHE] – or fractional values, the effect is then referred to as the “fractional quantum Hall effect” [FQHE].
- The FQHE is generally associated with the coming into being of a new type of (quasi)particle called “anyon” (Laughlin, 1999, 863; Laughlin doesn't use that term, which comes from Wilczek). Anyons have a striking peculiarity: they obey fractional statistics, making them neither bosons nor fermions. As it appears, anyons are to be counted among the elementary particles of nature, on the model of photons (which are bosons) and electrons (which are fermions).
- The FQHE can be seen as the result of a transformation of a state of a physical system that involves electrons, to a state of the same system with anyons. Such a transformation leads to anyons being transformationally emergent from electrons, in the sense that the former both (diachronically and nonhierarchically) depend on and are autonomous from the latter. In particular, although anyons are a product of a transformation of electrons, they have new determinative powers and obey new laws. These powers are new in a strong sense: they are forbidden to exist in the pre-transformation phase according to natural laws. This striking observation has a theoretical counterpart: the quantum electrodynamical model that best captures the pre-transformation state lacks the resources for “talking about” anyons (it can actually only describe bosons and fermions). In the words of Laughlin himself: “[The discoverers of the effect – his Nobel co-laureates



Tsui and Stormer – found something] which should have been impossible” (Laughlin, 2005, 77).

- Accordingly, the science that study materials in which anyons arise is autonomous<sup>15</sup>. Rather than a “Theory of Everything” that will serve as the final and unique basis for explaining all there is – including the behavior of anyons – science is rather made of many irreducible “theories of things” (Laughlin & Pines, 2000, 30).

The upshot of this is condensalism is a viable view (though it can of course be mistaken as a true description of our world), so is therefore transformational organicism.

### 6.4.2 *Is Transformational Organicism More than Just Conceptually Sound?*

I see two ways in which a transformational version of organicism can be claimed to be more than just a conceptually consistent view. Without going as far as supporting the idea that there actually are proper transformations at stake in the biological world, together they at least provide hints that transformational organicism would deserve philosophical scrutiny.

A first way to go in this respect is to make use of an a fortiori argument. In the previous section, it has been claimed that there could be a proper transformation leading to transformational emergence in physics, to the effect that  $[C^{em}]$  was given some plausibility. Should such a claim go through, it would indirectly support the truth of  $[O^{em}]$ , for, a fortiori, if some relevant transformation does take place in the physical world, one could expect it to also occur in the biological world. After all, biological entities just are (or are also) physical entities. Without claiming of course that something like the FQHE occurs within organisms, it would be unsurprising that transformations of a similar nature occur among the very elementary constituents of organisms, for then “percolating up,” so to speak, to the organisms themselves.

This apart, another (certainly stronger) case can be made that transformational organicism deserves further exploration. It essentially rests on the fact that organicists themselves may have advocated – implicitly to be sure – something along the lines of transformational emergence. As an example, I here consider Soto et al. (2008)’s approach to emergence as it would be substantiated in developmental biology.

As I see it, the core of their approach can be captured through the three following ingredients: diachrony, downward causation, and the breaking of the causal closure

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<sup>15</sup> Obviously, as the considerations developed here make it clear, the idea of autonomy understood under the transformational perspective is slightly different from the one associated with traditional, synchronic emergence. In the transformational approach, the usual epistemic cutoffs have to be understood diachronically. For instance, non-derivability, unpredictability, or non-explainability has to hold between antecedent and posterior states, and not between higher- and lower-level states. For more details about the impact of such a way of construing autonomy onto the structure of science, see Sartenauer (2019).

of the physical world. For any philosopher that is well-versed in the arcane of the emergence literature, this for sure appears as a quite odd combination. Indeed, if one takes these ingredients at face value, they together delineate a position that happens not to take the best of two worlds, as it were. In the pursuit of biology's autonomy, buying into diachrony alone could actually be enough – this is the main message of transformational emergence – to the extent that there is no need to endorse an extra, possibly controversial commitment to downward causation and the correlative breaking of the causal closure of the physical world. Similarly, biology's autonomy could very well be advocated on the basis of a commitment to the existence of downward causation and the correlative breaking of causal closure, without adding a nonconventional, diachronic twist to the picture.

In the face of what thus appears as an unnecessary metaphysical inflation, two interpretative options are available. First, what *really* matters to Soto et al.'s emergence is downward causation (and the correlative breaking of closure), diachrony being a rather peripheral, extra ingredient. If this is the case, then their account happens to collapse on O'Connor and Wong (2005)'s theory of emergence, which itself is to be taken as conceptually isomorphic to *synchronically* strong emergentism, its self-proclaimed diachronic nature notwithstanding (Wilson, 2015). The issue with this first option is blatant: as it was emphasized in Sect. 3.1, it “dangerously” looks like full-fledged vitalism.<sup>16</sup>

Hopefully, a second option is available. It consists in taking diachrony seriously while not sticking to the letter of the traditional way of framing downward causation (and its purported implications on closure). There are reasons to believe that this actually is Soto et al.'s implicit strategy. For one thing, they are adamant about the importance of taking time seriously – “Time is acting [...]. This action is real and has an ontological meaning” (Soto et al., 2008, 271). But furthermore, they also seem to adopt a conception of downward causation that is very different from what emergentists usually have in mind when appealing to the notion (most of the time critically). As they put it: “[B]asic properties are changing [...]. This is the meaning of downward causation” (*Ibid.*, 272). That the very determinative effectiveness of emergents is to be understood through the changing of basic properties should ring a bell. This is indeed nothing else than the defining claim of transformational emergentism. Keeping in mind that the main motto of transformational emergence is indeed that novelty comes from the “parts” changing through time (rather than being organized\*), the following kind of claim renders the association rather legitimate:

By the time the tissue is formed, the ‘parts’ that we identify in them are no longer the parts that interacted in their formation. The cellular components now present did not pre-exist the tissue itself – they are interacting in a particular way that is reciprocal. When we artificially separate the components of the tissue, for instance the cells forming epithelium and its

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<sup>16</sup> It is noteworthy that such an association is not a source of great trouble for O'Connor and Wong, as they are explicitly willing to defend a version of property dualism at the service of a libertarian agenda. And what doesn't seem (apparently) *that* unreasonable when it comes to the obscurities of the mind turns out to be less legitimate when it comes to biological phenomena.

subjacent stroma, cells cease to perform the functions they executed when together in their proper three-dimensional arrangement (*Ibid.*, 268).

Though it is not the time and place to initiate a new philosophical exploration, it is noteworthy that the viability of the transformational emergence that is at stake here rests on the assumption that (at least some) biological kinds should be functionally individuated, to the effect that a given biological entity, say a cell, is to become a new individual as soon as it begins or ceases to exercise its proper function in the organism. Such an idea is certainly not heretical, especially with respect to organismism, as the words of one of the founding fathers of the view indicate:

If a large bomb is dropped upon a populous town we might apply the term ‘town-plasm’ to the debris which remained, but it would be a little absurd to say that towns were composed of such town-plasm, and that from a sufficient knowledge of such debris it would be possible to gain an adequate knowledge of the organization of towns (Woodger, 1929, 294).

In such a (unnecessarily morbid) scenario, it is indeed contended that the very process of a town’s explosion is not to be construed as the disruption of an organization\*, the unchanging parts – town-plasm – being once organized\* and then not anymore. Rather, the town’s explosion is a proper *transformation*: what was at some point an individual (let’s say, the roof of a bank and the gates of a school) simply stops being such once the explosion occurred.

### 6.4.3 A Possible Objection and the Way Forward

Before wrapping up, it is important to defuse a possible objection that might be raised against the conceptual possibility of a genuine form of transformational organismism<sup>17</sup>. In a nutshell, the objection goes as follows: as it has been shown in Sects. 4.1 and 4.2, it might be the case that transformational emergence does occur in nature, be it within some (possibly restricted classes of) physical or biological systems. Accordingly, transformational emergence might serve as a possible tool for arguing in favor of the autonomy of certain scientific fields within the physical and the biological sciences, as well as, incidentally, within other areas of science (e.g., the chemical, psychological, or sociological sciences). But, should that indeed be the case – and here actually lies the objection – what appears as transformational emergentism’s very high degree of *generality* is largely outbalanced by its concomitant low degree of *specificity*. As such and with regard to what really matters here, the previous discussion does not provide legitimate reasons why organisms (or other biological systems for that matter) should be transformationally emergent in a specific way and, accordingly, why the specific science that study them, namely, biology, should be autonomous.

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<sup>17</sup>I would like to thank a reviewer of this chapter as well as the editor of the volume for having drawn my attention to this possible issue.

I think this objection actually picks up on an important point. It reveals a possible blind spot in the reflection carried out so far, whose origin lies, I think, in the very conceptual, generic, and decontextualized methodology that has been adopted to drive home the chapter's main point. Indeed, when organicism is conventionally characterized through [O<sup>o</sup>], "X makes organisms emerge<sup>y</sup> from a physical basis. That organisms emerge<sup>y</sup> makes biology an autonomous science" – it reduces the inherent subtlety of the view to its core autonomist *end*, irrespective of the specificity of the *mean* to reach it. And with such a chosen focus, it is the very "chauvinist" flavor of some variants of organicism – intimately associated with the claim that organisms are somehow of a quite unique and remarkable nature – that is downplayed.

In the face of such an objection, I see two countermoves. First, in the spirit of *avoiding* – rather than defusing – the issue, one might be willing to bite the bullet. For all we know, not all organicists, past, present, and even future, need to be chauvinists about organisms and might actually find themselves happy with the idea that the autonomy of biology is not intrinsically tied to some empirical fact – be it organization\* or transformational emergence – that should *only* obtain within organisms. But, in the spirit of reaching to as many strands of organicism as I could, I'd rather adopt a second, more interesting strategy.

Though this has not been frontally addressed so far, I actually believe that there are ways in which organicists' chauvinism might be safeguarded along the lines of the empirical thesis [O<sup>em</sup>] established in Sect. 2.2 ("there is some *restricted* class of entities in nature, namely, organisms, that are the product of a transformation"). Put differently, there actually is a story to tell about the possible specificity of transformational emergentism as applied to biology. Although exploring this line of thought in detail is certainly the topic of a completely different paper, it is worthwhile mentioning here two possible strategies in that regard, which both take inspiration from Dobzhansky's (1973) famous *dictum*: "Nothing in biology makes sense except in the light of evolution."

A first way to go would be through the following steps:

- (i) Natural selection, which is the driving force of evolution, has the ontological status of a law of nature (Reed, 1981).
- (ii) Natural selection is a fundamental, nonderivative law of nature (Rosenberg, 2006)<sup>18</sup>
- (iii) There is room in all the available metaphysical frameworks about laws of nature for the possibility that the set of fundamental laws changes through time (Sartenaer et al., 2021). In particular, there is room for thinking that (the law of) natural selection wasn't "preformed" before some instant in time, at which it actually "appeared" together with whatever constituted the first units of selection.

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<sup>18</sup>A claim that is often cast in terms of natural selection being a "force" that cannot be reduced to other forces (be they evolutionary or not). That Rosenberg actually embraces some form of reductionism, that he considers the law of natural selection as being (oddly) chemical in character, or that he doesn't necessarily embrace some form of nomic realism isn't what matters here. The point is that considering the law of natural selection as fundamental isn't completely heretical.

- (iv) That the set of fundamental laws actually at play at some instant in time can change is taken to be coextensive with transformational emergence (Humphreys, 2016; Guay & Sartenaer, 2016).
- (v) The first units of selection – *and only them* – are transformationally emergent.

It is noteworthy that this argumentative schema is only claimed to have *programmatic* validity. Rather than properly legitimizing a chauvinist version of transformational organicism – which it clearly doesn't – the proposed schema reduces to what merely constitutes a possible research agenda for the view.

Given that this first strategy is intimately associated with the ontological category of laws of nature, and given that such a category might plausibly be totally out of place in biology (Smart, 1959), one might be willing to envision an alternative approach that rather relies upon an ontological category that is better suited for biology, and to which the category of laws of nature may be taken to reduce, namely, *individuals* or *objects* (and their properties, in the spirit of, e.g., Machamer et al. (2000)). Such an alternative approach, which also has the validity of a research plan, goes as follows:

- (i) Biological evolution has been the occasion of several “major evolutionary transitions” (Szathmari & Maynard Smith, 1995).
- (ii) While some of these transitions were “organizational” or holistic, some were rather “transformational” (Jablonka & Lamb, 2006) – like the one from RNA to DNA – in the sense that they were diachronic and flat (or “rank-free”; Okasha, 2011).
- (iii) Such transitions were the occasion of the coming into being of new biological individuals (Godfrey-Smith, 2011; Clarke, 2013).
- (iv) The advents of such new individuals are to be construed as instances of transformational emergence.

Obviously, a lot should be said in order to provide (iv) with some plausibility, though it strikes me as perfectly congruent with Soto, Sonnenschein, and Miquel's line of thought as described in Sect. 4.2, where the ontological nature of emergence at stake is to be grounded in a change in objects rather than laws.

As it appears, in the face of the objection according to which transformational emergentism might fail to be specific to biology, and hence fall short of appropriately grounding some (chauvinist) variants of organicism, there exist some prospects – to be fully fleshed out to be sure – of rendering the view sufficient for vindicating the autonomy of biology.

## 6.5 Conclusion: The Good Fortune of Organicism

Contrary to the received wisdom, I showed in this chapter that organicism could actually fare well even if, for some reason, it finally turned out that organization\* is an illegitimate notion. That organicism doesn't really need organization in order to

remain chauvinist about organisms and autonomist about biology doesn't entail, to be sure, that organization is not a good way, or even the best way, to meet such standards. The claim made in this chapter is of a purely conceptual nature: there certainly is a possible world in which, although organisms are not organized\*, organicism is a flourishing doctrine that happens to be true.

Though certainly not conventional, organicism without organization\*, or transformational organicism, has some *prima facie* interesting features, which together concur to make it an option in the reductionism/antireductionism debate that deserves further exploration. To begin with, transformational organicism has no need to reify "levels of nature," so it happens to be consistent with the currently rising deflationism about levels in the philosophy of biology (see Potochnik and McGill (2012) and Eronen (2015)). Incidentally, as it eschews any commitment to putative forms of downward determination, there is no risk for transformational organicism to be assimilated to dualistic forms of vitalism, nor to be undermined by Kim-style exclusion arguments, which notoriously cast doubts on the very viability of (even thinly) ontological forms of (synchronic) emergence (Kim, 2005).

As it appears, with such a backup plan, the prospects of organicism look very good indeed.

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