

THE CATEGORY OF LIFE, MECHANISTIC REDUCTION, AND THE UNIQUENESS OF BIOLOGY

Wendell Kisner, Ph.D.

ABSTRACT: The conceptual and ontological determinacies belonging to the category of mechanism, determinacies that began to occupy centre stage within the scientific and philosophical understanding of nature in seventeenth century Europe, continue to tacitly serve as theoretical underpinnings in contemporary conceptualizations of biological life for many scientists as well as philosophers. The conceptual hegemony enjoyed by the category of mechanism since the seventeenth century is even evident in the tacit reliance upon it by some contemporary theorists who otherwise wish to regard themselves as having gone beyond mechanism in their conceptualizations of life. I will argue that such inadvertent reliance is the result of a failure to make these conceptual and ontological determinacies belonging to the category of mechanism explicit through a critical examination of the category of mechanism. In the *Science of Logic* Hegel carries out precisely such a critical examination and explicit development of the determinacy implicit in mechanism, along with the conceptual and ontological determinacies appropriate to chemistry, teleology and, finally, biological life. Whereas reductive mechanism is commonly criticized by opposing it with an alternate account said to be more ontologically, definitionally, or empirically adequate, Hegel's *Science of Logic* shows that the category of mechanism considered in itself on its own terms is self-undermining or unsustainable due to its own inherent contradictions. Furthermore, the *Logic* shows that rendering the implicit determinacy of mechanism explicit necessarily leads to the development of conceptual determinacies that are appropriate to living processes. Because the conceptual development of these latter determinacies results from the inherent unsustainability of mechanism, mechanistic determinacy cannot provide a basis for the conceptualization of life. For this reason, the category of life is rigorously irreducible to that of mechanism. The exegesis provided in this paper of Hegel's account of the category of mechanism and his derivation of the idea of life from that category will provide the justification required for the above claims.¹

KEYWORDS: Ontology; Speculative Philosophy; Hegel; Biology; Life; Mechanism; Reductionism; Physicalism

1. This exegesis is an abbreviated version of a more detailed exposition of these sections of Hegel's *Logic* that I provided in my unpublished doctoral thesis, *Life as Idea: The Irreducibility of Life to Mechanism in Hegel's Logic*, (DePaul University, 1996).

INTRODUCTION

In the *Science of Logic* Hegel undertakes a critical examination of the category of mechanism, carefully developing every nuance of implicit determinacy suggested in it. For reasons we will see, this development leads us through the demise of mechanism to “chemism,” in which a conceptual determinacy that can more properly be characterized as “chemical” supplants the purely mechanistic level of determinacy. Chemism in turn reveals inherent contradictions of its own that make necessary a concept of purposive activity or “teleology.” Finally, to the degree that the latter is conceived as “external” purposiveness—viz. as a purposive activity which makes use of a material external and indifferent to it—it still retains a residual mechanistic determinacy and thereby fails to adequately express purposiveness. When such purposiveness is adequately expressed in a determinacy adequate to it, it is life. In this way we are led to the conceptualization of life as a certain kind of purposive self-relation. Difficult as it is, some exposition is necessary in order to present the case that Hegel does in fact demonstrate this development, and that this development has certain implications regarding how we think of living beings vis a vis the mechanisms to which they are not reducible but which they must necessarily presuppose.² As with any argument, presenting only its conclusions would not only fail to demonstrate their necessity but also, particularly in this case, would not allow one to see the positive ontological character of life that is implied.

The argument entails a logical development of categories through their inherent contradictions—the well-known Hegelian “dialectic.” In order for the argument to work, however, the development must be immanent. That is, it cannot be a matter of externally importing and applying a preconceived methodology or conceptual paradigm. This requires that we avoid merely assuming even the much-celebrated conceptual apparatuses often attributed to Hegel such as “thesis-antithesis-synthesis” or the simultaneous negation/preservation implied by the German term “*Aufhebung*.” Rather, any development must be carried out only and solely with respect to the conceptual determinacies implicit in the category under examination without surreptitiously introducing anything given independently of those same determinacies. The *Logic* purports to show that rendering categories explicit necessarily entails their own supersession or negation in such a way that they develop into other categories that overcome the deficiencies seen in their predecessors, deficiencies which are never merely generic but rather display a specific character germane to the category in question.

To say that category A “develops into” category B means that category B *is* category A rendered fully explicit. But it is not matter of adding characteristics or additional features to A in order to arrive at B, because the development of A at the same time shows its own unsustainability. This unsustainability lies ultimately in the fact that what a category shows itself to be—its own conceptual determinacy— can no longer be sufficiently accounted for in terms of the specific determinacy that belongs to that

2. As I argue elsewhere, this ontological conceptualization of life also entails implications regarding how we act toward living beings and hence an ecosystem ethic. See 'A Species-Based Environmental Ethic in Hegel's Logic of Life' in *The Owl of Minerva* (forthcoming).

category. In other words, the determinacy belonging to a category cannot adequately express what that category is. This inadequacy of a category as measured by its own determinacy—that is, its self-contradiction—renders it unsustainable and at the same time implies a new category that would be adequate. Thus the demise of an unsustainable category at the same time entails the development of a new category that is more adequate. This immanent logic of implications in categories is the Hegelian “dialectic.”

Truth then, for Hegel, is what a category shows itself to be through its own immanent dialectic. In other words, truth is what something shows itself to be when its own implicit determinacy is rendered fully explicit. If the category of mechanism is self-undermining in this way it cannot remain a fixed set of determinations, and so cannot provide a basis for the conceptualization of life. In other words, if the determinacy specific to the category of mechanism cannot be sustained, not because it fails to correspond to some independently given empirical reality but because of its own self-contradictory character, then it cannot provide an ontological foundation upon which to conceive of living organisms. To put it another way, if the category “life” is developed from the category “mechanism” through the latter’s *unsustainability*, then life is rigorously irreducible to mechanism. This is precisely what Hegel’s *Logic* purports to demonstrate, arguing that the category of life shows itself to be the truth of mechanism rather than the other way around. The Hegelian argument thereby does not posit a “vital principle” added to mechanistic determinacy, nor does it provide some *other* account of life *opposed* to the mechanistic one, but rather merely claims to think through the very ontological structure of mechanism itself, rendering its conceptual determinacy explicit, and thereby arrive at a category of life that cannot be adequately conceived within the limits of that conceptual determinacy.

This does not mean, however, that the determinacy of mechanism disappears or is simply rejected or discarded. Rather, it means that mechanistic determinacy is an *underdetermination* of life. In other words, just as a Van Gogh painting would be nothing without the chemical components making up the pigments on a canvas and yet cannot be adequately accounted for by an exhaustive description of the latter, so also living organisms will not exist without certain mechanistic and chemical processes yet cannot be adequately accounted for by an exhaustive description of the latter. The reasons why these processes cannot account for life is what Hegel’s argument purports to show, and this will not be a matter of externally adding other characteristics to them but of explicitly conceiving them in their own terms—that is, by making their own determinacies explicit. This argument will then also necessarily imply a certain positive ontological structure that anything called “life” must minimally possess. In other words, whatever *else* living beings may be, they must *at least* express the determinacy made explicit in the category of life.

This paper concerns only the ontological difference between living systems and mechanical ones as conceived at a certain level of conceptual abstraction, and not the differences among the various forms of living systems themselves. An inquiry into the

latter topic would require a detailed exposition of Hegel's treatment of living beings in the *Philosophy of Nature* and also an account of the relation of this treatment to the empirical sphere in general. The *Logic* does not give us a full account of life or of living organisms—for instance, it does not distinguish between plant and animal life. But what it purports to provide are the *minimal* conceptual/ontological determinacies for an adequate account of what “life” is. If Hegel is right, then one can claim that life must at least be conceived in terms of these determinacies. The power of Hegel's account of life in the *Logic* is that it shows us that even at this minimal level, mechanistic categories are unsustainable in themselves and are therefore simply inadequate for thinking what life is.

In seeking to gain a more adequate ontological understanding of living process than that presented by mechanism and its contemporary variants, the problem faced by empirical and phenomenological approaches is that of *access*—starting with the environment as a *given* and with living organisms as *given* within it, it is unclear whether or not it is even possible to work one's way back to the ontological structure that life is. Heidegger himself is quite aware of this problem of access, remarking in 1929/30 that “the difficulty is not only one of *content* with respect to *what* life in general is but equally and even more emphatically the difficulty is a *methodological* one: *by which path* can and should the living character of what lives become accessible in its essence.”³

In other words, as long as we begin with something given to thought, that givenness implies that thought has to relate to something other than it—even if that “giving” is conceived, outside the terms of beings in general, as a quasi-transcendental condition that grants the appearing of anything that is. The being of the living organism then not only becomes problematic in terms of *its* access to beings, but also *our* access to what is and is not accessible *to it* becomes a perhaps irresolvable issue. Indeed, this may well be one reason why Heidegger essentially abandons the question of non-human life after the 1929/30 lecture course, becoming content to relegate the animal to an existence without both world *and* environment.⁴

Hegel, however, is not saddled with the distinction between being and thinking that is implied whenever we conceive of something as *given to* thought. That is, Hegel is not saddled with what he calls the “opposition of consciousness,” and so he can derive ontological categories without the assumption of a subject who entertains those categories.⁵ Such an ontological derivation is precisely the work of the *Science of*

3. Martin Heidegger, *Die Grundbegriffe der Metaphysik: Welt-Endlichkeit-Einsamkeit*, Frankfurt, Vittorio Klostermann, 1983, pp. 265-266.

4. Heidegger remarks, “World is always a world of the spirit. The animal has no world nor any environment” (*An Introduction to Metaphysics*, trans. R. Manheim, New Haven, Yale University Press, 1959, p.45). This statement marks a striking departure from his earlier, bolder, claims: “In the broadest sense death is a phenomenon of life. Life must be understood as a kind of being to which belongs a being-in-the-world” (*Being and Time*, trans. Joan Stambaugh, Albany, State University of New York Press, 1996, p. 246).

5. Even though Heideggerian phenomenology, for instance, explicitly rejects the concept of “consciousness” due to the Cartesian baggage imputed to it, insofar as he begins with an assumption of givenness which entails the problematic of access—whether the “we” who seek to gain access to a given phenomenon are conceived as Cartesian subjects or as *Dasein*—it still looks like what Hegel would have called the “opposition

Logic, in which we find a development from the category of mechanism to that of life. Only by thinking life from out of the self-determining movement of thought, as Hegel does, can its ontological character be unfolded in such a way that the opposition of consciousness—for instance the phenomenologist’s or empiricist’s perspective—does not insert itself and render *access* problematic. For this reason the empiricist as well as the phenomenologist can only approach life externally—their very approach bars them from thinking the ontological structure of life *as it is in itself*. To put it in Kantian terms, phenomenology and empiricism will only ever be able to say what life is *for us* rather than what it is in itself. For this reason Hegel offers a way of thinking that is overlooked in many contemporary Continental discourses as well as in Analytically oriented ones. It is neither a transcendental step back from a given to its conditions of possibility, nor does it presuppose a predetermined logical structure which we externally apply to an independently given empirical content.

However, this is not a vicious idealism in which we reject the empirical world in favor of pure thought-constructs. Empirical reality will become relevant, but not as a measure that determines the categories that frame it. To this extent Kant was correct to assert the a priori character of the categories. But whereas Kant assumed an independently given empirical content for categories that are in themselves purely formal and empty, Hegel rejects this assumption as insufficiently self-critical insofar as the very distinction between thought (categories) and what is given to thought (empirical content) is itself a distinction that thought makes, and as such already presupposes categories whose necessity has not been demonstrated. Hegel therefore claims to derive the content of the categories from a logic implied within the structure of those very categories without appealing to anything given independently. Whereas on the surface this may look like an idealism that collapses objective reality per se into a purely subjective sphere of thought, this appearance is mistaken on two counts. On the one hand, to assume such a “subjective sphere” is to already posit a categorial distinction between the subjective and the objective, or between thought and being. Any such categorial distinction must be derived rather than merely assumed as given in advance. On the other hand, the empirical sphere of nature will be made explicit as the contingency that necessarily shows up in the derivation of categories. That is, the very category of contingency is itself shown to be necessary—and herein also lies Hegel’s derivation of the category of “necessity” as the necessity that there be contingency⁶—but that very contingency in turn equally means that there must be an empirical sphere whose empirical features

of consciousness.” The issue for Hegel is not whether or not we assume a subject as objectively present (viz. as *vorhanden*) but whether or not we assume a *givenness to...*thought, subject, human existence, etc. So even if Heidegger takes over Husserl’s orientation to phenomena as given to consciousness while rejecting the appeal to “consciousness” as uncritically presupposing a Cartesian ontology, leaving the bare *es gibt* of being, from a Hegelian perspective the problematic of givenness remains.

6. *Hegel’s Science of Logic*, trans. A. V. Miller, Atlantic Highlands, Humanities, 1969, pp. 542 ff. (*Wissenschaft der Logik II*: Werke 6, Frankfurt, Suhrkamp, 1969, pp. 202 ff.). For a helpful account of Hegel’s derivation of necessity from contingency and its implications, see Stephen Houlgate, “Necessity and Contingency in Hegel’s *Science of Logic*,” *The Owl of Minerva*, vol. 27, no. 1, 1995, pp. 37-49.

cannot be exhaustively specified in advance by thought, thereby opening up a realm of externality that is “nature.”

THE ONTOLOGICAL CHARACTER OF HEGEL'S PROJECT

Because an opposition of consciousness (or any of its variants) is a categorial distinction that must be derived rather than assumed as given independently, it is a mistake to assume that the categories derived in the *Logic* are merely epistemological as opposed to ontological.⁷ If there is no justification for placing thought over and against being at the outset, then it is also a mistake to assume that there must be a problem of gaining access to what is to be thought “about” as if we’re trying to get to something outside thought. Therefore I will assume that Hegel’s derivation of categories in the *Logic* is not just an epistemological account but an ontological one as well. However, this is not the same thing as positing an identity between thought and being, which would be to smuggle in underived determinacies without justification (e.g. determinacies like “thought,” “identity,” etc.). Rather, the point is merely to *avoid assuming* any distinction between thought and being as given in advance. It is the collapse of the distinction between thought and being or of the ability to distinguish between a “for us” as opposed to an “in itself”—that is, the collapse of the “opposition of consciousness”—that concludes the *Phenomenology of Spirit* and thereby opens the door to a systematic derivation of the categories without assuming such a pregiven standpoint. The latter is what Hegel purports to achieve in the *Logic*. If the category “being” with which the *Logic* in turn begins does not refer to anything outside what is thought in that category—it cannot be assumed to be something that appears *for* a consciousness insofar as that very distinction has been shown to be unsustainable—then the determinacies derived from its own content are what “being” shows itself to be. Even without reference to Hegel’s *Phenomenology*, all we need do is follow the phenomenological epoché of Husserl and suspend presuppositions,⁸ which would necessarily include the aforementioned one. Hence the *Logic* is an onto-logy in the complete sense of a logos of being.

This ontological character and its level of analysis also differentiates the Hegelian account from the task that has preoccupied much of the philosophy of biology within the empirical/analytical tradition which, rather than pursuing questions about the truth of what life is in itself at an ontological level, often rests content to make “epistemic” claims “about the relationships between biological and physical *knowledge*, as embodied

7. For a criticism of one variant of epistemological interpretations of Hegel, see my review of John Burbidge's book *Real Process: How Logic and Chemistry Combine in Hegel's Philosophy of Nature* (Toronto, University of Toronto Press, 1996) in *The Owl of Minerva*, 1999, Vol. 31, No. 1, 66-79.

8. Indeed, this is what Heidegger did when he took Husserl's methodology beyond Husserl himself and suspended the assumption of consciousness. We might say that Hegel merely carries this through more radically than Heidegger, suspending even the very givenness that Heidegger leaves intact. Of course, this then means that we're no longer in the sphere of a "phenomenology" at all. However, Heidegger may have done us the favour of showing by an alternate path that Cartesian dualism is ontologically unfounded, thereby at least reducing the necessity of the *Phenomenology* within Hegel's system as a prerequisite to beginning philosophy proper.

in current and prospective developments in biological and physical science.”⁹ Thus the dispute between the reductionists who hold that biological phenomena are reducible to the mechanistic laws of physics and the antireductionists who deny this claim often comes down to competing theses about what we can know, leaving room on either side for an ontological caveat (as scientific knowledge of the universe improves, we will understand how biology reduces to physics ... or we will discover the biological property that forever evades such reduction, etc.). However, Rosenberg and McShea point out a certain ontological assumption usually held in common by both parties: “Almost all parties to disputes about reductionism acknowledge allegiance to physicalism,” which is a metaphysical thesis asserting “that the basic facts about the world are all physical facts, and that the physical facts determine and/or make up all the other facts.”¹⁰

There is an ambiguity in this conception, however, between “determine” and “make up.” As we will see below, Hegel understands mechanistic determinacy to be an underdetermination of life, which itself has a determinacy specific to it above and beyond mechanism. Thus, as indicated above, Hegel can agree that the level of mechanical physics is necessarily part of everything else in the universe—just as the physico-chemical pigments of a painting are necessarily part of the painting—without assuming that it *determines* everything else exhaustively. But this difference between determination and underdetermination gets obscured if not concealed entirely in the seemingly innocent word “fix” when those who subscribe to the thesis of physicalism sum it up by saying that “the physical facts ‘fix’ all the other facts.”¹¹ Because questions raised about the truth of life at an ontological level are swept away in advance under the banner of a “physicalism” that “fixes” the facts, the question with which such theorists are often preoccupied on both sides of the reductionist/antireductionist divide is which side of the divide can better generate a research program for the empirical life sciences.

Nonetheless, the admitted absence of any “laws” in biology that might correspond to the physics model necessarily leads to an examination of concepts above and beyond any purported derivation of laws.¹² Even if limited to the sphere of epistemology, a self-critical approach would nevertheless call for a critical examination of the categories employed. Positivists may well still assert that such critical examination can best be carried out by forming testable hypotheses and measuring them against empirical data. Such a Baconian paradigm of knowledge as predictive power, however, not only fails to clarify its own ontological basis but it already presupposes the opposition of

9. Alex Rosenberg and Daniel McShea, *Philosophy of Biology: A Contemporary Introduction*, New York, Routledge, 2008, p. 97.

10. Ibid. p. 99.

11. Ibid. Indeed, this admittedly ambiguous verb “to fix” will subsequently inform the entirety of Rosenberg’s and McShea’s account of biological reductionism, thereby begging certain important questions in advance. To be sure, the authors acknowledge the ambiguity between physical facts composing biological facts and a “weaker sense” in which they are seen as somehow “causing them to obtain without composing them, so that the biological facts are distinct and different from the physical facts and any combination of them.” (Ibid. p. 100) But they leave this ambiguity unresolved and then proceed to casually refer to a supposed “fixing” of the facts throughout their treatment.

12. Ibid. p. 105, 112.

consciousness and to that degree fails to be self-critical. So no matter how much one might like to avoid ontological questions, a truly self-critical project would still demand the derivation of determinacy without presupposing any determinacy given in advance of the derivation. And it is this that we cannot do so long as we limit ourselves to the empirical/analytical approach, given the latter's presupposed divide between thought and the empirical data given to it.

But even if reductionists may be happier to rest content with epistemic theses and operational definitions within a Baconian paradigm, antireductionists cannot really afford to do so. Whereas reductionists can "argue that reductionism as a research strategy has been vindicated by the course of scientific developments since the seventeenth century,"¹³ such success in Baconian power cannot be as easily attributed to belief in vital forces or non-physical principles. Thus within the limits of a Baconian paradigm, reductionism enjoys a certain hegemony and the onus falls on the antireductionist camp to vindicate itself. Furthermore, as long as the antireductionist arsenal against reductionism consists only of appeals to empirical data—as in the demonstration that "physical differences need not make biological differences" in adaptive function, for instance, which thereby seems to render physical explanations of those biological differences irrelevant¹⁴—one would still have to overcome the reductionist rejoinder that "the antireductionist has at most shown that the epistemological obstacles to reduction are temporary, when what they need to show is that they are permanent and reflect metaphysical obstacles, i.e. obstacles in principle."¹⁵ In other words, "the antireductionist has to identify more than epistemic obstacles to refute reductionism."¹⁶ Hegel's systematic derivation of categories is one such way of countering the reductionist rejoinder—not, however, by merely showing that epistemological obstacles to reduction "reflect metaphysical obstacles" but by carrying out the analysis at an ontological level in the first place and, on that basis, showing that reductionism is refuted in principle.

In addition to understanding the *Logic* as ontology above and beyond mere epistemology, I also subscribe to the kind of interpretation advanced by Stephen Houlgate, Richard Winfield, and David Kolb among others,¹⁷ which reads the *Logic* as if it does not anticipate where it is going, nor which assumes that Hegelian dialectic must presuppose an absolute spirit as a horizon against which it carries out its movement. Heidegger, for instance, tries to make the criticism that having already traversed the system, Hegel's standpoint can only be that of absolute spirit.¹⁸ This kind of criticism

13. Ibid. p. 101.

14. Ibid. p. 110.

15. Ibid. p. 111.

16. Ibid. p. 113.

17. See for instance Stephen Houlgate, *The Opening of Hegel's Logic*, West Lafayette, Indiana, Purdue University Press, 2006; David Kolb, *The Critique of Pure Modernity: Hegel, Heidegger, and After*, Chicago, University of Chicago Press, 1986; and Richard Winfield, *Overcoming Foundations: Studies in Systematic Philosophy*, New York, Columbia University Press, 1989.

18. Martin Heidegger, *Hegel's Phenomenology of Spirit*, trans. P. Emad and K. Maly, Indiana University Press, Bloomington, 1988, pp. 25, 41, 78-9, 112-3, 136, 141, 149.

reads the structure of consciousness into the entire system¹⁹—rather than engaging in the immanent dialectic itself, it steps back from it to a presupposed horizon of “absolute spirit” (which Heidegger misunderstands as the standpoint of representing subjectivity raised to an absolute level) and interprets all the logical moves against this presupposed horizon. But insofar as Heidegger’s argument turns on the claim that the dialectical development is inconceivable without the assumption of such a horizon, if the logical development can be shown to work without such a presupposed standpoint then we can dispense with it. In each case any development of categories is something immanently implied within those very categories without reference to a presupposed endpoint which, just as much as the opposition of consciousness, could only be an unjustified determinacy illicitly smuggled in. The success of such an interpretive methodology—which again amounts not to positing something in advance but precisely the suspension of any such positing—can only be measured by carefully following the course of the logical development in detail without skipping over the transitions in a hurry to get to a conclusion. Hence, difficult as it may be, an exposition of the categories relevant to mechanism and life is necessary.

A BRIEF OVERVIEW OF THE *SCIENCE OF LOGIC*

Before launching into that detailed exposition, however, a few remarks about the *Logic* as a whole will be helpful to situate the former within the context of the latter’s overall development. In order to articulate and systematically derive all determinacy without naively presupposing some determinacy as given, the Hegelian project must secure its beginning in a thought that is not mediated by any presupposed determinacy. The *Logic* cannot begin with presuppositions about what thinking is either—it cannot assume the principle of non-contradiction, the principle of identity, or any of the other axioms of formal logic for that matter. Such a presuppositionless “thought,” Hegel suggests, is that of “being.” But this is not the thought of “being” as opposed to “nothing,” or “being” as determined in any way. This beginning is in fact a sheer gesture towards an abstraction—a thought which has been abstracted from all determinacy. Such an abstraction is necessary in Hegel’s view in order to secure a presuppositionless beginning. But it’s no more than just that—a beginning. It is not an axiomatic foundation or ground that we must assume or believe in. It’s just a thought that we can think and, in doing so, see where it leads us. This is the austerity of Hegelian thought—to conceive the categories in their abstraction apart from any independently given content. The categories themselves have a content, and the philosophical task is to make that content explicit.

Thus to object, say, that Hegel does not actually begin in immediacy but presupposes a historical tradition for which the thought of being has been determinative is to avoid

19. For Heidegger’s own brief synopsis of the way he situates the entire Hegelian corpus within the framework of subjectivity and its standpoint of representation, cf. *Nietzsche*, v. III, tr. D. F. Krell, San Francisco, Harper Collins, 1991, pp. 222-3. Also see Heidegger’s lecture course on the *Phenomenology: Hegel’s Phenomenology of Spirit*, trans. P. Emad & K. Maly, Indianapolis, Indiana University Press, 1988, pp. 78-80 and 126.

beginning where the *Logic* begins. In other words, the beginning is abstracted from any mediating structure whatsoever, including that of a mediating history which could only present us with a notion of being that is already determined in some way. To begin the *Logic*, one must neither posit some determinacy at the outset nor step back from the thought of being to a mediating structure presupposed as given. In other words, reflection has to abstract itself from its own habitual activity.

Thus the *Logic* begins with sheer immediacy—abstract, immediate being. But since this sheer positive immediacy is indistinguishable from pure nothing, the most affirmative category, being, shows itself to be thoroughgoing negativity. Being is not negative because it must mark itself off from what it is not but rather is in itself intrinsically negative in its very immediacy. Pure being is indistinguishable from pure nothing, which for its part can only *be* nothing and so is itself indistinguishable from being. This oscillating movement of being to nothing and back again, a movement generated by the category of being itself, is in fact immediately a new category: becoming. Being thus passes over into its other, becoming, through its own intrinsic negativity. The sphere of being in general is marked by this kind of immediate transition into an other. The negativity is immediate and so there is yet no unity with the other. Because there is always a transition into an other, no identity can be maintained. Each category, in immediately being what it is, cannot be what it is but passes over into something else. This process of immediate transition into another category constitutes the first part of the *Logic*, which Hegel calls the “logic of being.”²⁰

Eventually it becomes apparent that immediacy cannot be sustained without mediation. Being can only immediately *be* insofar as some kind of mediating structure allows it to be what it is, and for that reason being cannot be simply immediate. Here we enter into the sphere of transcendental reflection, where immediate being is seen to depend upon conditions of possibility or grounds of various sorts. This grounding of immediacy in mediation marks the sphere Hegel calls “the logic of essence” (or *Wesenslogik*) and it constitutes the second part of the *Logic*. If being is the sphere of immediacy, essence is the sphere of mediation. Unlike the categories of being, the determinations of essence do not immediately pass over into what is other than them, but each maintains its identity against its other. Each has an identity whereby it is what it is, but it can only be this identity over and against an opposite.

However, this renders its identity illusory. That is, an *essential* determination has no self-subsistence because it only has its identity through the other, against which alone it can be the determination that it is. The same structure holds with respect to the other as well. The opposites are thus “reflected into each other,” as Hegel likes to say, and each only *seems* to be a self-subsistent identity. Insofar as each determination can only be itself over and against its opposite, the identity of each consists in its *not* being the other. Thus both are bound together in an inseparable unity. Because each is what it is by *not* being the other, and this not-being-the-other unifies them, the unity is a *negative unity*.

A negative unity holds between A and what is *not* A, where each is what it is by *not*

20. For a detailed exposition of this part of the *Logic*, see Houlgate, *The Opening of Hegel's Logic* (op. cit.).

being the other and so each is inseparable from the other—it is a unity *of* opposition. However, if neither A nor not-A has an identity of its own, then the “not” that holds them *apart* is likewise a semblance. But if A and not-A cannot be held apart, then neither can be an identity *over and against* the other. Therefore the unity of opposition (negative unity) is only a *seeming* unity insofar as the identity of each whereby they are mutually *opposed* is a seeming identity, rendering the mutual opposition a seeming opposition, and therefore rendering the *unity of* opposition a seeming unity. That is why the negative unity that shows itself in the sphere of essence is an illusory unity based as it is upon the semblance of identity.

The semblance character of essence only persists so long as there seems to be something standing over and against its mediation. The very mediating structure of essence seems to be something simply “there” and immediate. In other words, the mediating structure and that which is mediated by it appear as separated, and this difference seems to maintain the immediacy of both sides. The immediacy of being was continually undermined by its implicit mediation until it was simply seen to be based upon mediation, at which point being passes over into essence. In the sphere of essence the immediacy of being shows itself to be mediated, but immediacy still shows itself also insofar as the mediating structure of essence itself seems to be immediate. In the sphere of being, immediacy—in being immediate—continually finds itself mediated; in the sphere of essence, mediation—in mediating—continually finds itself immediate. Being tries to get away from mediation and fails, as it were, and essence tries to get away from immediacy and fails.

This structure of mediation characteristic of the sphere of essence also collapses—not because it is seen to be mediated by an other or by an opposite, but because it ultimately shows itself to be *self-mediating*. The mediated and the mediating can no longer be held apart. In this self-mediation a unity is established that has real self-subsistence insofar as it does not disappear in otherness nor does it only *seem* to be subsistent against an opposite. The whole ontological development is now seen to be self-determining, and the identity that is established at this point is no longer merely a semblance. This self-determining ontological process is what Hegel calls “the concept” (*Begriff*) and in this way the concept emerges out of the collapse of essence.

The identity or unity established at the level of the concept is no longer seen to be simply and immediately “there.” It is indeed an immediacy, but it is an immediacy that shows itself to be a *result* of self-mediation. Immediacy does not just go away in the face of mediation—if this were the case, immediacy would have been merely reinstated at another level (that is, the mediating structure itself would appear as something immediately given), and we would thereby merely have another version of essence. Rather, *the very immediacy of immediacy itself* is self-mediating. To put it another way, the negativity of self-mediation is no longer something which *prevents* immediate positive being from being what it is. Rather, that negativity is precisely what *constitutes* the unity present and thereby *establishes* self-subsistent being *in its very immediacy*.

Unlike the negativity that pertained to the sphere of essence, this negativity is the

negative unity of “the concept”—in the sphere of essence there only seemed to be a unity because it was undermined by negativity, whereas in the sphere of the concept the negativity of mediation establishes itself *as* an immediate unity. We can see from this how in Hegel’s text the entire sense of terms and phrases (such as “negative unity,” “identity,” etc.) undergoes a complete transformation in and through the dialectical development within which these terms appear (which is why it is a mistake to try to summarize the dialectic with phrases like “thesis-antithesis-synthesis” or even specialized German terms like *Aufhebung*). Thus the “identity” of the concept is not the same as the “identity” that appears in the logic of essence. It is essentialist thinking that wants to posit such an “identical identity” in which difference and identity are still regarded as being at odds with each other in some way. This is what Hegel calls “abstract identity,” a category he also claims is the basic category of the (non-philosophical) understanding, as can be seen when many of the so-called “postmodern” critiques of Hegel attempt to preserve difference against identity, to valorize one over the other, etc.²¹ The *Logic* shows that this category is unsustainable, not because it is tacitly constituted by an exterior which it excludes or because it presupposes the latter as its condition of possibility (or by any other such transcendental or essentialist reflections), but rather because identity as such cannot maintain its self-identity. What Hegel then calls the self-identity of the concept is not this kind of identity.²²

Now insofar as the concept establishes its identity not by holding itself apart from mediation but by becoming self-mediating or self-determining, it cannot “remain behind” as an identity that underlies or that is prior to its mediating movement. In the sphere of the concept, viz. in the sphere of self-mediation, an identity cannot be something that remains formally distinct from its own self-determining. This means that the concept has to *lose itself to be itself*. In other words, what a determinacy is—its identity—is nothing other than what it determines itself to be. It is not determined by something other than it. In the sphere of being, a determinacy becomes what it is through the preceding category’s dialectic. Thus the category “becoming” is what it is through the dialectic implied by the category “being.” Through its own immanent logic, “being” cannot remain what it is but passes over into its other, “becoming.” The sphere of being is marked by this continual becoming-other in which each category that appears is lost in the movement. In the sphere of essence, a determinacy maintains its identity through its opposition to another determinacy—it only is what it is by *not* being the other. Thus difference is what it is by not being identity, and identity likewise is what

21. See for instance Jacques Taminiaux, who writes:

The absolute is by definition that which absolves itself from all reference, that which, in the difference and the game of references which it carries, becomes equal to itself, coincides with itself. The result is that at the very moment when it is recognized as radical, the difference is no more radical but derived or, what comes to the same thing, uprooted. It follows that at the very moment when it seemed to be discredited, the scheme of coincidence is only dilated, and words such as coincidence, adequation, equality, invade the whole Hegelian text.

(*Le Regard et l'excédent*, The Hague, Nijhoff, 1977, cited in Kolb (op. cit.) p. 219.

22. Herein lies the error of the “postmodern” criticism that, like Taminiaux cited in the previous footnote, objects to what it perceives in the Hegelian text as a privileging of identity, unity, self-coincidence, etc.

it is by not being difference. Each is likewise an identity through its difference—the identity of “identity” and the identity of “difference” are each maintained *against* the other. But the identity of each is also thereby undermined insofar as such identity is only achieved through the other which negates it.

There is no identity present in the sphere of being insofar as each category disappears into an other. There is an identity that emerges in the sphere of essence, but it is a mere seeming identity, a semblance. Only in the sphere of the concept, insofar as this is the sphere of self-mediation, can a genuine (non-illusory) identity be established. But because this identity is that of self-mediation or self-determination, it is not the abstract identity that stands over and against difference as an opposite but rather is an identity that becomes what it is through becoming other. The sphere of the concept in a way brings together the two previous spheres of being and essence. Rather than being lost in becoming-other, as in being, or only seeming to be something over and against an opposite, as in essence, in the concept a determinacy is what it is—that is, it maintains its identity as the determinacy that it is—in and through its becoming-other.

This kind of identity that is its differences is precisely what is meant by universality—a universal is a determinacy that remains itself in its other, viz. the particular—so the initial determination of the concept is the universal. However, in the identity-of-difference that the universal is there are nonetheless two distinct terms—identity and difference. Because difference is not collapsed into an abstract identity, the terms are distinct. But the distinctness of these terms does not fall outside the unity of the concept, because its unity is difference. Thus this differentiation is not something that befalls the universal but is its own self-determining, without which it would not be the universal that it is. However, this also and equally means that the moment of difference, to be different, is not the universal but is something particular. To put it another way, the *identity of* identity and difference is the universal, and the *difference between* identity and difference is the particular, and since the universal is the concept whose identity is its differences, the moment of particularity does not fall outside universality but is its own determinate content. The self-determination of the universal means that it is “particularized” *as* its differences.

Insofar as the unity or identity present is achieved or maintained through “self-othering” or self-loss, and this character of “loss” is a negation, it is a further development of the negativity whose fate the *Logic* follows from its first appearance as the inherent negativity of being. In the sphere of being no unity could be maintained. In the sphere of essence an illusory unity is maintained against an other, and so is a negative unity. In the concept that negative unity is self-mediating. Whereas in the sphere of essence there were two levels characteristic of a mediating structure that mediates something else, as quintessentially seen in the ground /grounded relation, in the sphere of the concept these two levels collapse into one. But although there is no *hierarchical* difference present between mediating and mediated determinacies (e.g. as in the ground/grounded relation), there is nonetheless a conceptual distinction between them, and this distinction appears in the sphere of the concept as the *negativity* of the negative unity and

the self-subsistent *unity* that is established by that negativity. This negativity, appearing over and against self-subsistence as such, is the “subjective concept.” “Subjectivity” initially refers to this kind of one-sided negative unity, wherein its negativity and its unity appear as distinct. Insofar as the subjective concept develops the determinacies of universality, particular, and individuality, its development further entails the structures of “judgment” and “syllogism.”²³

This development ultimately demonstrates that the conceptual distinctions between universality, particularity, and individuality are unsustainable insofar as each one of these three moments equally contains the other two. At this point, rather simply being a self-mediation that has resulted from something other than its own self-mediating process—as was the case when the subjective concept first appears out of the demise of essentialist structures—the self-mediation characteristic of the concept has resulted from its own self-mediating process and thereby has become more fully self-mediating. As Winfield puts it, because in the subjective concept “the minimal determinacy of self-determination has arisen from the categories of essence, self-determination has not arisen from itself, as it must do to be what it is.”²⁴ This latter requirement is met when each of the “moments” or aspects of the subjective concept—universality, particular, and individuality—becomes equally self-meditating in its own right. Only at that point do we have independent self-mediating totalities. But insofar as each moment of the self-determining process is itself an independent self-determining process, each moment subsists on its own without reference to the others outside it. Indeed, the relationship between the moments of the self-determining process has become one of mutual externality and indifference—each moment is completely external and indifferent to the others. It is precisely in this externality and indifference that the independent self-subsistence of each moment consists. With this development, the subjective concept has passed over into *objectivity*.

The sphere of the concept in general—that is, the sphere of self-mediation—emerges out of the collapse of essentialist determinacies that cannot bring together what mediates with what is mediated. Rather than being an unstable immediacy, as in the sphere of being, or a mediating process that is undermined by its own immediate character, as in the sphere of essence, a self-mediating immediacy emerges. Even though there are no longer two levels to this process, no surface versus deep structure as in the ground/grounded relations of essence, there remains a vestigial difference between the mediating and mediated aspects of the process that appears in the distinction between the negativity of a negative unity and the unity established by that negativity. Whereas in the subjective concept the side of negativity takes center stage, as it were, in objectivity the side of unity takes center stage. To put it another way, in the self-mediating immediacy that characterizes the sphere of the concept in general, the side

23. For a detailed exposition of this part of the *Logic*, see Richard Winfield, *From Concept to Objectivity: Thinking Through Hegel's Subjective Logic*, Burlington, Ashgate, 2006. As Winfield points out, these structures articulate the possible ways of conceiving the relations between universality, particularity, and individuality, and as such can be thought without reference to an independently given consciousness.

24. Winfield, *Ibid.*, p. 137.

of mediation comes to the fore in subjectivity whereas the side of immediacy comes to the fore in objectivity. The latter immediacy is indeed self-mediating, and it is precisely a degree of self-mediation not yet present in the subjective sphere that brings about the externality and indifference necessary for independent self-subsistence. Yet it is also precisely because of the externality and indifference present that the very self-mediating character that brings it about in the first place gets reduced to a merely implicit level. Its self-mediating character becomes overshadowed by its externality and indifference, as it were. The concept as subjective fails to sustain itself as such, and subjectivity as a negative unity is lost in the sheer externality of objectivity, the initial shape of which is *mechanism*.

Hegel claims that it is this kind of self-subsistent unity we have in mind when we refer to an "object" in general.²⁵ Objectivity here is precisely the self-subsistence that was lacking in subjectivity.²⁶ The concept of a mechanical object is thus the concept of a self-subsistence constituted through sheer indifferent externality, and as such entails the loss of the subjective side. That is, its self-mediating character becomes reduced to an implicit level. Only in being thoroughly external in this way can it be an object marked off from other objects and thereby independent of them and subsistent on its own apart from everything else. To put it another way, when we think of a mechanical object we are conceiving of something that actually exists on its own, not as a mere reflection over and against something else as in oppositional determinacy (e.g. in the sphere of essence), but as an existent entity whose self-subsistence is maintained in complete indifference to whatever else there may be. An asteroid shooting through space, for instance, subsists on its own regardless of the relations it may enter into. Even if it's pulled into another body by the latter's gravitational pull and destroyed, it is utterly indifferent to this operation upon it and subsists in itself as an object to which such things can befall. Shattered into a thousand shards, each fragment is likewise a self-subsistent object external and indifferent to the other fragments as well as to the unity of the asteroid of which it once formed a part.²⁷

25. As Winfield notes, this "object" is "not a relative 'object' in the sense of a '*Gegenstand*', determined in reference to an underlying structure of consciousness that posits what it confronts. Objectivity instead comprises an absolute object, a '*Sache*', that can be the object of true knowing insofar as it is determined in its own right, possessing an objective character rather than a subjective description relative to whatever subject projects determinacy upon it." (Ibid. p. 139)

26. My interpretation differs from Winfield's here in that I take the self-subsistence established by mutual externality and indifference to be the characteristic attribute of objectivity that was lacking in the subjective concept, whereas Winfield claims that "this self-sufficiency of objective determination does not distinguish objectivity from subjectivity." (Ibid. p. 136) For Winfield objectivity is characterized by overcoming the externality still present in the subjective concept between its mediating and mediated aspects. (Ibid. pp. 136-7) However, this latter interpretation has to be reconciled with the fact that Hegel explicitly characterizes the first shape of objectivity as a structure of sheer externality and indifference through which the independent self-subsistence of objects is established.

27. We should bear in mind, however, that all such appeals to empirical givenness for the sake of illustration cannot be taken to be determinative factors in the development of the ontological determinacy we're following here in the *Logic*. All determinacy in the latter should follow strictly from the determinacy implied in the categories themselves without reference to anything assumed to be given independently of

In mechanism the self-mediation of the concept *is* externality. Because of this thoroughgoing externality, there can be no “inner” identity that remains what it is in the face of externality—which again could only be the essentialist determinacy of an inner identity over and against an opposite determinacy in externality. Because there can be no “inner” identity that maintains itself against externality this way, this means that its very character *as* self-mediating must be external to it. Its self-mediation has determined it to be sheer and utter externality, and as such it must therefore be external *to its own determination as externality*, and hence its character as self-mediating is external to it. *Negative unity thereby becomes self-external*. For the same reasons, in its sheer externality mechanistic determinacy can only be utterly indifferent to the way it is determined. Such thoroughgoing externality could not have made its appearance prior to the sphere of the concept insofar as self-determination is necessary for self-externality—the concept as mechanism is not external to an other or to an opposite but rather is external to itself. The mechanical object is not merely external *to* something else; its very determinacy *is* sheer externality, and as such it is likewise characterized by utter indifference to that determinacy.

THE HISTORICAL CONTEXT OF MECHANISTIC DETERMINACY

Hegel does not merely take up the category of mechanism as given historically but rather shows it to be a necessary moment in the overall systematic development of categories in the *Logic*. Be that as it may, it might nonetheless be helpful to situate this characterization of mechanism in terms of externality and indifference historically so we might better grasp the pervasive influence of the category in post-seventeenth century Europe and thereby also its continuing relevance today.

The conceptual determinacy of mechanism as indifferent externality is perhaps first explicit in Descartes’ notion of *res extensa* and is preserved in Newton’s characterization of natural movement.²⁸ In the second of his *Meditations*, Descartes represents a “body” as having no inner orientation toward its own proper place as did Aristotle’s conception of natural bodies—for Descartes a body can only be moved “by something foreign to it.”²⁹ In his *Principles of Philosophy*, Descartes states that “a body at rest, on the other hand, cannot be expelled from its place except by some force coming from outside, which produces a change.”³⁰ Anything that is a “body” is fundamentally characterized

them. That is, the logical development should be strictly immanent. As Winfield points out, “Hegel takes great pains to forewarn readers that objective process has a logical determination that can have physical and psychological embodiments, but can just as well be detached from those realities of nature and mind.” (Ibid. p. 139)

28. I provide a more detailed treatment of the relation between Hegel’s conception of mechanism and that of Descartes, Galileo, Aristotle, and Newton in Chapter 1 of my doctoral thesis (op. cit.).

29. René Descartes, *Discourse on Method and the Meditations*, trans. F. E. Sutcliffe, New York, Penguin, 1968, p. 104.

30. In René Descartes, *The Philosophical Writings of Descartes*, vol. 1, trans. J. Cottingham, R. Stoothoff, D. Murdoch, New York, Cambridge U. Press, 1985, p. 245.

by externality with respect to its motion.³¹

We can trace the precedent for this determination of extension in an early incomplete and posthumously published work from the years 1629-33. The part that concerns us is called *The World*, in which Descartes claims that nature is matter, and matter is the most elementary idea. The essence of matter in turn is extension. In his criticism of other theorists, Descartes writes that “the whole difficulty they face with their matter arises simply from their wanting to distinguish it from its own quantity and from its external extension.”³² Extension itself, the very form and essence of nature as matter, is conceived initially in terms of externality. This externality becomes more explicit in the laws governing all motion, first formulated in *The World* and appearing again in the *Principles of Philosophy*: “The first of these laws is that each thing, insofar as it is simple and undivided, always remains in the same state, as far as it can, and never changes except as a result of external causes.”³³ Here the determination of natural bodies in terms of externality is made more explicit.

Rectilinear motion comes in with the second law: “The second law is that every piece of matter, considered in itself, always tends to continue moving, not in any oblique path but only in a straight line.”³⁴ As Heidegger pointed out, there is no such obstacle-free body moving in a pure rectilinear motion anywhere—this is not something that can ever be observed or brought to experience.³⁵ Why then presuppose this non-existent body as the paradigm for all of nature? Neither Galileo nor Newton make anything more of this than a hypothetical representation whose “confirmation” lies in the calculative results that can be produced through it. Descartes too is willing to allow his account of physical causes in the *Principles* to be regarded in this way.³⁶

Since actual rectilinear motion is nowhere to be found, the only thing that remains relevant are the *changes in motion* Descartes attributes to nature and understands in terms of his postulated laws. Thus all natural motion is externally imparted. Now insofar as space and body are equally determined as extension, there is no longer any sense of place in the old Aristotelian sense.³⁷ Descartes writes, “The terms ‘place’ and ‘space’, then, do not signify anything different from the body which is said to be in a place; they merely refer to its size, shape and position relative to other bodies.”³⁸ As Heidegger noted, “place” becomes “position” along with the quantifiable distance between positions, as opposed to the Aristotelian concept of place as intrinsic to natural bodies.³⁹ But because a body is now no longer seen as striving toward its own place, because it has no sense

31. Again, no distinction is made here between animate and inanimate bodies, and thus Descartes had to conclude that the functioning of animals is analogous to that of ordinary mechanisms like the clock.

32. Ibid. p. 91-2.

33. Ibid. p. 241.

34. Ibid. p. 96 and 241-2.

35. Martin Heidegger, *What is a Thing?*, trans. W. B. Barton & V. Gendlin, Chicago, Henry Regnery, 1967, p. 89 and *passim*.

36. Ibid. p. 255.

37. Ibid. p. 227-9 (*Principles* 2:10-15).

38. Ibid. p. 228.

39. Heidegger, *Ibid.*, p. 82ff.

of “its own” anything but is determined as externality, it is indifferent to what position it occupies and to how it is moved. It is determined through and through in terms of externality and indifference.

In the Cartesian conception—and, aligned with Descartes, that of Galileo and Newton as well—a body no longer has an inner nature in terms of which it moves the way it does. In its thoroughgoing indifference it no longer has anything “proper” to it. It is what it is in terms of sheer externality and indifference. This indifferent externality *is* its determinacy, which is precisely what Hegel claims is the minimal ontological determination of mechanism *per se*. But if the determinacy of a body *qua* mechanical is externality and indifference, this means that *its own* determinacy is that it has no “its own.” Thus the body is indifferent to its determinacy which, as indifferent externality or external indifference, *is external to it*. Its own determination is external to it, and so it has to be externally determined to be the very indifferent externality that it is, and so its determination is not its own.

This is the ontological structure Hegel develops in the *Logic*, showing that the category of mechanism as the sphere of indifferent externality cannot sustain itself as such. But it is this determinacy of externality and indifference that scientists and philosophers may often presuppose and fail to make explicit when they try to assert the autonomy of biology from the physical sciences, and so they unwittingly carry over these determinations into a conception of biological life that is supposed to be free of mechanism or at least irreducible to it. In this way they tacitly conceive that which is supposed to be non-mechanistic within the ontological framework of mechanism, *viz.* externality and indifference. The eminent contemporary biologist Ernst Mayr, for instance, wants to reinvoké some version of teleology as appropriate to the subject matter of biology, but he only admits it as circumscribed by the sphere of mechanism—though he himself does not acknowledge this, not having made the determinacy of mechanism explicit. He thinks that he is situating himself beyond the domain of sheer mechanism as well as vitalism, but the mechanism he is “beyond” is unfortunately only a certain crude form of it rather than mechanistic determinacy *per se*, whose determinations thoroughly infuse his purported recuperation of “teleology.”⁴⁰

Mayr rejects what he calls “cosmic teleology,” the idea that the universe has an overall goal or purpose. But he notes that there are manifest processes in the development of individual organisms and in organ adaptation which are goal-directed, and for which mechanistic thinking has always been at pains to adequately account. Thus teleology has remained a problem through even the twentieth century. He then claims that the “solution” is only now evident: “It is now clear that seemingly goal-directed processes exist in nature which are not in any way in conflict with a strictly physico-chemical explanation.”⁴¹ But of course, even the most thoroughgoing reductionist would not disagree that there are *seemingly* goal-directed processes—what appears superficially as

40. See Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution, and Inheritance*, Cambridge, Belknap/Harvard, 1982, chapter 2.

41. Mayr, *Ibid.*, p. 48.

teleology is actually an effect of mechanistic forces at work, forces the elaboration of which can completely account for what only seemed to be teleology.

Mayr attempts to address the problem of teleology through a specification of what he takes to be the different senses of the word—a lexical solution. Throughout his account, however, he will refer to purposive behavior as “seeming.” It is in the sense of teleology he calls “teleonomic activity,” or simply “teleonomy,” that he finds the most legitimate application of the concept of teleology to biological phenomena. “Teleonomy” refers to “a physiological process or a behavior that owes its goal-directedness to the operation of a program.” The genetic code would be an example of such a program. In this category he places all physiological development as well as “all seemingly goal-directed behaviors of individuals.”⁴²

A program regulates the entire process, the behavior as well as the end point toward which the behavior is directed. With respect to causation “the program as well as the stimuli which elicit the goal-seeking behavior precede in time the seemingly purposive behavior”⁴³ thus setting up a strictly mechanistic causal chain. The “program” of course is a result of natural selection, which means that certain genetic programs had greater survival efficiency and so they replicated themselves more and/or more often. Mayr writes that “the truly characteristic aspect of teleonomic behavior is that mechanisms exist which initiate or ‘cause’ this goal-seeking behavior;”⁴⁴ hence such behavior only seems to be purposive; “really” it is an effect of mechanism, rendering the *telos* in “teleonomic” merely nominal. Because of the tacitly assumed mechanistic determinacies that surreptitiously guide Mayr’s entire account, it is not actually an account of teleology at all but rather a reduction of teleology to mechanism dressed up as a theory of teleology. This account is in fact completely consonant with such uncompromising reductionists as Richard Dawkins, for whom “We are survival machines—robot vehicles blindly programmed to preserve the selfish molecules known as genes.”⁴⁵ Every mechanist readily admits *seemingly* purposive behavior.⁴⁶ Thus any *telos*, for Mayr, is merely a semblance, an epiphenomenon that conceals the real mechanistic forces that drive it. Due to his failure to adequately think the ontological determinacy of mechanism, the latter remains intact

42. Ibid. For an account of teleology in Kant and Hegel that also makes the connection to contemporary biology in general and to Ernst Mayr’s conception of teleonomy in particular, see Daniel Dahlstrom, ‘Hegel’s Appropriation of Kant’s Account of teleology in Nature’, in *Hegel and the Philosophy of Nature*, Stephen Houlgate (ed.), New York, SUNY Press, 1998, pp. 167-188.

43. Mayr, Ibid.

44. Ibid., p. 48-9.

45. Cited in *From Gaia to Selfish Genes*, Connie Barlow (ed.), Cambridge, MIT, 1991, p. 195.

46. Nor does Mayr abandon the qualification of “purposive behavior” as “seemingly” purposive in his later work (cf. Ernst Mayr, *Toward a New Philosophy of Biology*, Cambridge, Harvard University Press, 1988, pp. 44ff.) Even when he criticizes cybernetics, he does so on the grounds that the latter has in view the wrong kind of mechanisms, not that it is mechanistic per se, and the kind of mechanisms he specifies makes his account if anything even *more* mechanistic than that of cybernetics: “*The truly characteristic aspect of goal-seeking behavior is not that mechanisms exist which improve the precision with which a goal is reached, but rather that mechanisms exist which initiate, i.e. ‘cause’ this goal-seeking behavior.*” (Ibid., p. 46, Mayr’s emphasis) So whereas even cybernetics might leave room for a goal-seeking behavior that makes use of mechanisms for precision without actually being caused by them, Mayr eliminates this possibility.

and untouched, thoroughly infusing his thinking while he naïvely believes his account to be beyond mechanism. We can see from this that the mechanistic determinations of externality and indifference require that teleology be reduced to a mere semblance, and we will see in the Hegelian account provided below that it is the very character of this determinacy that actually facilitates its entrenchment in everyday representations.

The failure to explicitly conceive of the implicit determinacy of mechanism can also be seen in the way Mayr represents mechanism itself. He asserts, for instance, that the “rejection of vitalism was made possible by the simultaneous rejection of a crude ‘animals are nothing but machines’ conceptualization.”⁴⁷ Apparently it is only this “crude” form he has in view when he conceives of “mechanism.” Likewise, the empirically given “mechanisms” that François Jacob regards as “insufficient to explain the functioning of living organisms” constitute only one possible variant of the conceptual determinacy which characterizes mechanism, and thus he writes that with the further realization after the seventeenth century of the complexity of living organisms, “the difficulty of ascribing all their properties to mere impulses acting on pulleys, levers and hooks increased.”⁴⁸ Although Jacob refers to this as an “initial version” of mechanism which “could not resist the growing weight of observations,” he thereby implicitly leaves room for a later and more subtle version. If only a certain set of laws and a certain articulated body of theory are regarded as “mechanism,” with respect to which “the concept of life did not exist,”⁴⁹ the decisive question remains as to whether or not and if so to what degree a genuine transformation has occurred with the advent of biology as a separate science.

Mayr too wants to hold out for a difference between organisms and inanimate matter “not by postulating a vital force but by modifying rather drastically the mechanistic theory.”⁵⁰ Even so, however, mechanism is not actually superseded or overcome as a determining category but only “modified,” and it is not clear that such modification has conceived of mechanistic determinacy at all, let alone altered it “drastically” enough to justify the assertion of a definitive difference between living organisms and inanimate matter. If mechanism is merely modified in such a way that it is preserved as a determining ground of biological conceptions, one will no longer be able to say with G. G. Simpson, as Mayr wishes us to, that biological systems are “systems different in kind from any nonliving systems,”⁵¹ and biological theory will not be able to extricate itself from the umbrella of physics. The conception of life would not then call for new categories irreducible to mechanism, but could be adequately represented as a more efficient and more complex machine, different in degree perhaps but not in kind. So even though Mayr apparently wishes to resist these conclusions, given his assumption of mechanistic determinacy it’s not clear that he can.

47. Mayr, *The Growth of Biological Thought*, p. 52.

48. François Jacob, *The Logic of Life*, trans. Betty E. Spillmann, Princeton: Princeton University Press, 1973, p. 36.

49. *Ibid.* p. 89.

50. Mayr, *The Growth of Biological Thought*, p. 52.

51. *Ibid.* p. 35.

That resistance is particularly evident in the attention he gives to the theory of “emergence,” which designates the “appearance of new characteristics in wholes” which “cannot (not even in theory) be deduced from the most complete knowledge of the components, taken separately or in other combinations.”⁵² Thus “complex systems must be studied at every level, because each level has properties not shown at lower levels.”⁵³ It is the theory of emergence to which he immediately appeals after making the claim, “The last twenty-five years have also seen the final emancipation of biology from the physical sciences.”⁵⁴ To be sure, emergence is not solely relevant to the distinction between life and mechanism, but insofar as it refers to the “appearance of new characteristics in wholes” it “is equally characteristic of inorganic systems.”⁵⁵ Nonetheless Mayr does insist that “the process of emergence...is vastly more important in living than in inanimate systems.”⁵⁶

If a theory of emergence is to assert emergent novelty with respect to living systems, however, it cannot be conceived merely as a modified mechanism but rather must be at least an acknowledgment of categories irreducible to mechanism insofar as a mere modified mechanism, to the degree that it preserves the same determinacy, would fail to show any such emergent novelty at all. It is not clear that Mayr is aware of the incompatibility of emergence and a reductive mechanism that merely modifies mechanistic theory. However, of particular interest here is the suggestion made by the theory of emergence that not only do the properties inherent in higher levels of complexity resist reduction back to properties of lower levels, but these higher-level wholes “can affect properties of components at lower levels.”⁵⁷ This implies that the lower level components *no longer remain what they were* due to what has emerged out of them.

This kind of “downward causation” may be what is overlooked by cybernetic theory, in which mechanistic components retain their essentially mechanistic character even though the relation engendered by the negative feedback loop cannot be explained solely with reference to the properties of components taken in separation.⁵⁸ However if, as per the thesis of emergentism, the very defining properties of the components themselves

52. Ibid. p. 63.

53. Ibid. p. 64.

54. Ibid. p. 131.

55. Ibid. p. 63.

56. Ibid. p. 131.

57. Ibid. p. 64.

58. Cybernetics was first formulated as a theory by Norbert Wiener in 1948, but was subsequently been taken up by various fields as an explanatory model. A typical example of a cybernetic system is the governor of a steam engine, where a self-regulating causal chain is set up. When the engine encounters an increased load, as in ascending a hill, the spin of the governor slows down causing its arms to drop, which causes more fuel to be fed into the cylinder, speeding up the engine and so also the spin of the governor, causing its arms to raise again and thereby causing less fuel to be fed into the engine, etc. Along these lines the living organism is represented as an aggregate that is self-monitoring through “negative feedback” (“negative” presumably because of the feedback’s inhibiting function). Underlying the apparently self-maintaining and self-preserving interpretive behavior of organisms is a mechanical process of negative feedback, i.e. a living organism is a cybernetic system.

are transformed in the higher-level whole, and if the genesis of the latter can only be explained through this transformation, then the higher-level whole is utterly irreducible to the lower-level components insofar as those components do not comprise a stable structure that could provide a *basis*. The *components as such*, i.e. the separable independent units, no longer exist, and to persist in thinking of them in this way is an abstraction that loses the higher-level whole one wishes to explain. In the case of living beings, to the degree that components are represented as separable independent units they are not “components” and there is no higher-level whole. This is the sense in which Aristotle claimed that a hand or eye severed from the body is no longer, properly speaking, a hand or eye at all.⁵⁹ Now a theory of emergence, understood along these lines, is exactly what Hegel shows us in the ontological development of the *Logic*. Although the concept of “properties” may not be entirely appropriate,⁶⁰ with the notion of emergence we do find ourselves in the neighborhood of the Hegelian notion of *Aufhebung*—the self-supersession of determinations such that they are negated in their abstract fixity and yet preserved in a transformed way as “moments” or under-determinations within a higher unity.

But due to the failure to think through the decisive determinacy here, Ernst Mayr’s attempt to overcome mechanism presents us with a salient example that confuses naïve mechanistic reduction dressed up as more than mechanism with a more credibly non-reductionist thinking called “emergence.” My claim is that the failure to make explicit the determinacy characteristic of the sphere of mechanism—viz. the conceptual nexus of externality and indifference—would indeed allow it to remain intact and thereby to inform modern thinking and theorizing with respect to biological phenomena. In other words, the attempt is made to free life from mechanism, but because mechanism is so narrowly defined and its minimal determinacy is left intact at a covert level, this leaves the conception of life prey to more subtle forms of mechanism. To avoid this failure, scientists would have to become more philosophical and undertake a self-critical examination of their own categories without assuming them to be given in advance.

At this point let us examine Hegel’s account of mechanism in detail to see in precisely what ways it is self-undermining and exactly how the self-contradictions immanent within its determinacy necessarily lead to a conception of life that is irreducible to that determinacy. Again, the material we are embarking upon here is quite difficult, and the reader’s patience and careful attention is required in order to follow its development. Difficult as it is, however, such a careful analysis is necessary in order to appreciate the demonstration of the irreducibility of life to mechanism. Mechanism is not an extant structure that is merely found on hand somewhere and taken up by an observing consciousness. To assume this would be to fall back upon an empiricism or phenomenology that confronts something given without deriving the categories in terms

59. *Parts of Animals*, 641a5.

60. The term “property” is specific to the category of a “thing” (*Ding*), merely one category among others in the “logic of essence” and so, according to Hegel, is no longer appropriate at the level of the concept in which the category of life appears.

of which that givenness is framed. Rather, mechanism is a conceptual movement that is set in motion by the contradiction that it is. To put it another way, mechanism is an ontological determinacy whose self-contradictory nature implies further determinacies beyond those that can be characterized as merely mechanical. But in order to see and appreciate this, mechanism *must be thought explicitly in its abstraction*. That is, it must be thought in its ontological character as sheer indifferent externality apart from any given empirical content. This is why Hegel's systematic derivation of the pure ontological categories in the *Logic* is important. Unless such a derivation is undertaken, categories such as the indifferent externality of mechanism can be uncritically adopted and "applied" to a given content, and the dialectical development that these categories imply will remain concealed. For this reason, I ask the reader to bear with me as we carefully draw out the conceptual implications contained within the category of mechanism.

I. MECHANISM

The *Logic* purports to show that mechanistic determinacy is self-undermining and that the reason for this lies in a contradiction implied by its character as a self-subsistence established through indifferent externality. Hegel brings us through all the tortuous twists and turns that the thought of a complete and thoroughgoing indifferent externality implies. The contradiction twofold. On the one hand, the mechanical object is self-subsistent or independent *through* its indifference and externality but, because of its thoroughgoing indifferent externality it is indifferent and external to its own determinacy *as* indifferent externality. But this can only mean that it must be determined to be a mechanical object externally, and therefore is *not* self-subsistent or independent. That is, insofar as it is determined externally its self-subsistence is undermined, yet it is this very externality that gives it self-subsistence in the first place. On the other hand, mechanical objects are mutually indifferent and external and at the same time are completely indistinguishable due to the fact that they each have the same identical determinacy of "indifferent externality." *Because* they are utterly external, they are utterly indistinguishable. But if they are indistinguishable, they cannot be mutually external. And if they cannot be mutually external, they cannot be self-subsistent objects. Therefore that which gives mechanical objects their self-subsistent independence at the same time takes it away from them.

This indicates a negative unity—in their very externality, in their not being identified with each other, the objects are completely identified with each other. That is, insofar as an object is defined as externality, it requires other objects that are not only external to it but which also determine it to be external. To be external it has to be determined externally, and this implicitly unifies it with that externality it needs to be what it is. This is a negative unity insofar as the objects are identical precisely by being mutually external, and it constitutes what Hegel calls "the mechanical process." At first this external determining appears to undermine the self-subsistence of objects. But the object needs this externality in order to be what it is, viz. a self-subsistence through

indifferent externality. As Hegel puts it,

...it is the object's own nature that points it *outside and beyond itself* to other objects for its determination; but to these others, their *determinant function* is similarly a *matter of indifference*. Consequently, a principle of self-determination is nowhere to be found; *determinism*—the standpoint occupied by cognition when it takes the object, just as we have found it here, to be the truth—assigns for each determination of the object that of another object; but this other is likewise indifferent both to its being determined and to its active determining. For this reason determinism itself is also indeterminate in the sense that it involves the progression to infinity; it can halt and be satisfied at any point at will, because the object it has reached in its progress, being a formal totality, is shut up within itself and indifferent to its being determined by another.⁶¹

It is this character of indifference to any external determining that is brought to bear upon it that facilitates the entrenchment of mechanistic objectivity in everyday representations. Although the object points outside itself for its determination, we only arrive at another object determined in the same way and so on ad infinitum, rendering any such “explanation” an “empty word” that tautologically duplicates the same determinacy and thereby merely expresses “just this externality and nullity of a difference.”⁶² But at the same time this very indifferent externality characteristic of an object, insofar as it renders its being-determined externally a matter of indifference, allows thought to come to rest in this determinacy as if no further determinacy is called for. The fact that any object is closed up within itself in indifference contributes to the ease with which mechanistic explanations are fixed upon, and lends a kind of false satisfaction that one has indeed explained something via this kind of appeal. In this way mechanism facilitates its own fixity in the understanding as a “reliable” category, one that offers itself as a refuge for explanation. Insofar as thought easily comes to a halt in the mechanical object due to its self-enclosed indifference, the latter also facilitates the failure to think through the implications of this very determinacy.

The character of the sphere of the concept as “self-loss” is manifest here—the very self-determination of the concept in mechanism means that the concept has determined itself as sheer externality, and consequently as *not* self-determined. The contradiction here is quite acute: the determinacy that belongs to an object—for the very reason that it is the determinacy of an *object* (i.e. indifferent externality)—does not belong to it. The understanding fails to hold these contradictory moments together in the single thought of the object. Lacking self-determination, any object points outside itself to what can only be another object, which likewise points outside and beyond itself, etc. , but this “pointing outside itself” is the object's own determinacy.

Hegel now goes on to render more fully explicit the contradiction contained here. If there is to be a real difference between two objects, then there must be at least some minimal determinacy in order to mark one object off as different from another. However, the empirical concepts of space and time have not yet been developed, and so we cannot

61. Hegel's *Science of Logic*, p. 713.

62. *Ibid.* p. 714.

presuppose them here by saying that two objects do not occupy the same space or time—this would be to introduce an independently given determinacy and so would not belong to the immanent development of the category of mechanism. Since any object is solely determined externally by another object which is likewise determined in the same way, any two objects have exactly the same determinacy and thus there is no way of making any intelligible distinction between them. There is no inner determination, no self-determination, present that might mitigate this.

The closed up totality whereby the object is self-subsistent through indifference is for that very reason externally determined. The object is indifferent to whatever constitutes its determinacy; therefore it does not derive its determinacy or specific character from some principle of its own but from other objects external to it. Its indifferent self-subsistence is such by being non-self-subsistent—that is, by being determined externally. Therefore, the closed system can only maintain its closure by being open to an external determination. Objects are capable of mutual interaction through their mutual determining functions to which they are indifferent, but the identity of their determinacy renders their difference merely formal. That is, with respect to the content of their actual determinacy they are indistinguishable. An object does not lose its self-subsistence but maintains it in the face of its being externally determined—insofar as its self-subsistence *is* indifferent externality, its being determined externally *is* its self-subsistence, which it maintains through indifference, and hence its determination is external to it.

Each object is thus determined to be the self-subsistent indifference that it is by another object, which in turn is indifferent to its determining function insofar as it too is externally determined to play that function. The identical determinacy is thus reduplicated—an object determines another object to be the identical determination (i.e. self-subsistent indifference to its determining as well as to its being determined as the self-subsistent indifference that it is). Thus the determinacy passes from one object to another unimpeded—it does not get transformed but remains the identical determination, thereby imparting the form of universality to itself, and so Hegel names this kind of interaction among objects “communication” (*Mitteilung*). This is the level of determinacy underpinning conceptions of the communication of “motion, heat, magnetism, electricity, and the like” from one object to another.⁶³

Now not only do the objects communicate the identical determinacy through which they are indistinguishable from one another, but they also and in the same moment are self-subsistent, mutually external and indifferent to one another—this is the very determinacy that is universally identical. Thus the objects are particularized over and against one another with respect to the universal determinacy that they all share, and in this universality the objects produce or establish themselves as individual objects through the self-subsistence that the universal determinacy is. Let us recap the development thus far: the object is immediate and indifferent to its determinacy, and therefore it is determined to be what it is by other objects to which it is indifferent and external and

63. Ibid. p. 716.

which for their part are determined in exactly the same way; insofar as the identical determinacy is being imparted externally and each object is constituted in the same way, the determinacy is communicated from one object to another in a mechanical process; therefore the determinacy as self-subsistence through indifferent externality is something universal found in all objects; and finally because of this each object is a particular instance of this universality.

But this development also means that the object can no longer maintain its sheer indifference to its universality. Rather than being merely *external to* its determinacy, it is a *particularization of* that determinacy—not by overcoming its indifference to it but by being a particularization of the very self-subsistent indifference it is universally determined to be. Through being externally determined as indifferent externality it is not external to this universality but is a particular instance of it. The universal has particularized itself through the communication which imparts a universal determinacy to objects in their indifferent diversity, determining them as this indifferent diversity and thereby each one as a particular instance of the universal determination that pervades all of them.

Insofar as the determinacy that gets externally imparted is self-subsistence, an object resists its being determined externally. That is, inasmuch as an object's determinacy is self-subsistence it cannot be merely indifferent to its being externally determined to the degree that such external determination undermines self-subsistence. Or to put it another way, self-subsistence is the determinacy being imparted, so it cannot simply be erased by external determination. The persistence of self-subsistence in the face of external determination is what Hegel calls "reaction." An object in reaction establishes itself as the determinacy that is communicated to it—self-subsistent indifferent externality—and must do so if that determinacy is to be communicated to it at all. For that very reason it is established as active against the action of the object which determines it. To maintain its self-subsistent indifference—the very universality which has been imparted to it—it must negate its determined character. It is determined as non-determined, and thus it repels its being-determined in reaction. But this means that it repels its very determination as object. It looks as if it can only be an object by repelling its determination as object.

For this reason the established individual self-subsistence of objects, which is their reaction, is "a wholly negative action" that "expels the positedness of an other in it and maintains its relation to self."⁶⁴ Thus its very specified determinacy as a particular instance of the universal is negated through this negative action—the object negates its character as a "particular instance of . . ." and only thus can remain the indifferent self-subsistent object that it is. This means however that through this negation necessitated by the determinacy of self-subsistent indifference that an object is, the interaction of objects as action and reaction "passes over into rest."⁶⁵ Rest arises due to the object canceling the effect of any other objects upon it. In this way the object maintains itself as a self-enclosed indifferent externality with respect to which the alterations of interaction,

64. Ibid. p. 717.

65. Ibid. p. 717-8.

communication and distribution, action and reaction show themselves to be “a merely superficial, transient alteration.”⁶⁶

Because the object is thoroughly indifferent, it is not indifferent but actively repels its external character. On the other hand, because it is not indifferent in this way, it is indifferent—precisely what is produced through its non-indifferent repelling action is its character as an indifferent object. Its non-indifferent action and its indifferent rest are one and the same thing. In being externally determined the determinacy imparted to it is to be *not* externally determined but indifferent self-subsistence and only thus really indifferent externality—its utter indifference is what constitutes the object in the first place as thoroughgoing externality, unrelated to any other. The more external it is, the less external it can be. The more it is determined by an other—that is, the less external and indifferent it is—the more external it is insofar as externality is the very determinacy that it is imparted to it.

The object’s determinacy as indifferent externality is what made it necessary that this determinacy be seen as external, and so the object appeared to be determined by other objects to be the object that it is. This was its “being-determined.” But through the development of this very indifferent externality—that is, by drawing out the immanent dialectic contained in the self contradiction that indifferent externality is—this “being-determined” has been negated. But whereas this “being-determined” at first may appear as an external power over the object, determining it from without, as the universality of which the object is a particular instance it is not an external power but is the object’s own determinacy—it is the object’s own self-subsistence and so is not external.

However, if the object can no longer be seen as externally determined, it must now appear as being determined “internally,” positing its own determinacy as object through its own process. Indifferent externality cannot be sustained insofar as it is implicitly the object’s *own* determinacy to which the object therefore *cannot* remain merely indifferent and external. To put it another way, the very external determining of the object turns out to be its own independent self-subsistence whereby it is an object at all, and therefore cannot simply be external to it. This means that the object’s being-determined-externally *is the activity of the object itself*, and so the self-determining character implicit in mechanism begins to show itself more explicitly.⁶⁷

But insofar as what it nonetheless determines itself to be is still, after all, indifferent externality, the latter character makes itself known as a mutual externality of objects that are simultaneously unified in their essential determinacy. This sets up a tension between the essential and the inessential—the essential “inner” determinacy of the object that pervades all of them as opposed to the inessential mutual externality and indifference among objects that constitutes their particular differences over and against each other. The tension of course lies in the fact that the “essential determinacy” here *is precisely indifferent externality*. This necessarily means that *whatever* a mechanical object

66. Ibid. p. 718.

67. It is with respect to this determinacy of a mechanistic process that determines itself to be what it is that with might situate the self-maintenance of cybernetic systems through negative feedback.

itself may be is, through its own essential determinacy, always external to it—including *its own essential determinacy*. Because it is indifferent *externality*, the determinacy which now appears as belonging to the mechanical object still appears outside it, only now it appears *as* its own essential character. Or we might say that the object has two sides: an essential determinacy of indifferent externality that is shared by all objects and thereby unifies them, and an inessential mutual externality and indifference between objects with respect to each other insofar as they are different objects. The contradiction here is that of a self-determination that determines itself as indifferent externality—the self-determining that the mechanical object shows itself to be is at odds with its own external character, which is precisely the determinacy given to it by its self-determining.

The universal determinacy *of* the object which falls *outside* the object as *its own* determinacy is self-subsistence (i.e. indifferent externality), and as such must be a self-subsistent object itself. To put it another way, just as the object formerly pointed outside itself for its determinacy to other objects that externally determined it to be such, now the object points outside itself to another object that appears as its essential inner determinacy. Since the determinacy present is self-subsistence through indifferent externality, that to which an object points outside itself for its determinacy cannot be a mere abstraction that is not itself self-subsistent, and so it must be another object just as before. The difference now is that the latter object, the one pointed to for the determinacy that determines it to be what it is, is a privileged object insofar as it embodies the universal essential determinacy pervading all objects.

But because this latter self-subsistent object is the true determinacy of mechanical objects in general and is thereby a privileged object, it cannot *just* be another object to which any given object is indifferent. All objects point to this one as their own true universal determinacy. A self-subsistent object to which objects relate as their true essence Hegel calls a “center.” The term “center” indicates this: the determinacy that is in fact the object’s own nonetheless falls outside the object whose determinacy it is. This is so because: 1) this determinacy determines the object to be indifferent *externality* and so must itself be external to it, 2) yet as the object’s own determinacy it is the truth of the object itself, and therefore 3) this determinacy *cannot* be merely external to the object. *Centrality* names this kind of relation.

As the true determinacy of mechanism this center appears as the *essence* of mechanical objects whose mutual externality with respect to each other is inessential. Because a separation between determinacy and what is determined has emerged, this development constitutes a lapse back into a quasi-essentialist structure. But insofar as the self-determining process *determines itself to be* precisely indifferent externality, the latter shows itself to be *posited by* the former. This means that insofar as indifferent externality is *explicitly posited by* the self-determining movement that mechanism shows itself to be, the movement generated by the contradiction that mechanism is now shows itself to be *self-movement*.⁶⁸ The final collapse of mechanism is seen in that objects have

68. This self-movement is the minimal characteristic of "soul," a term Hegel invokes here no doubt due to the fact that ancient philosophy simply defined soul (*psuche*) as self-movement. But insofar as it is not yet life

their independent self-subsistence as objects in and through their essential character as indifferent externality, and their essential character (as indifferent externality) is found in the center which appears as their essence, and therefore they have no independent self-subsistence outside that center. With respect to each other *outside* that center, however, objects remain mutually external and indifferent. However, *this* mutual externality and indifference of objects outside their center appears as something *inessential* insofar as the essential determinacy of objectivity lies in the center. However, their inessential mutual externality and indifference outside the center can only be maintained so long as they appear to be self-subsistent *alongside each other outside the center* in which they are unified. But insofar as objects have no independent self-subsistence outside the center, their *mutual* externality and indifference collapses.

Insofar as this mutual externality and indifference collapses, objects no longer have an *inessential* character, and therefore *can no longer appear outside the center* at all. But equally, since they are *objects* whose determinacy is independent-self-subsistence-through-indifferent-externality, they cannot simply collapse into an indistinguishable unity. The center is therefore no longer outside objects but now must be seen as the universal determinacy *immanent to* all objects. However, this universal determinacy is nothing other than the indifferent externality whereby the objects are objects at all, which again means that *whatever* an object *is* falls outside it—including its own *immanent* determination. Therefore any object can only find its own universal determination *in another object*. Any other object likewise exhibits the same determinacy.

An external “center” to which other mutually external objects relate is unsustainable, and the function served by that center is now distributed throughout objects in general. The center was the universal determinacy of mechanical objects which also appeared outside objects due to the fact that this determination was that of indifferent externality. It was thought as a “center” because it constituted the essence of the objects as opposed to their inessential externality with respect to each other. Once this distinction between the essential and the inessential collapses, that universal determinacy can no longer be found in a privileged essential object. However, it still must be external insofar as the determinacy is nonetheless externality. Therefore this universal determinacy now appears in other objects in general whose externality is no longer inessential but is the universal determinacy present in all objects. However, just as objects formerly could be mutually indifferent but could not be indifferent to their own essence in the center, now insofar as an object’s own determinacy is found in another object like itself, *it can no longer be indifferent to that other object*.

In this way the mutual indifference between objects passes over into mutual tension, where each object is 1) oriented toward another object insofar as that other object is *its own* universal determinacy and 2) simultaneously holds itself apart from that other object

proper, Hegel maintains a distinction between the modern conception of life and the ancient conception of *psuche*. Nonetheless insofar as self-movement by itself is not sufficient for an adequate conception of life, this suggests that the mechanical self-movement of cybernetic systems cannot by itself explain what living organisms are.

insofar as its character is that of an *independent and self-subsistent object*. This mutual *non-indifferent* tension of objects is no longer merely mechanical, but has become *chemical*. Each chemical object is what it is by being held apart from another object, only thereby being an independent object. But this also means that the externality whereby it is an independent object at all is *due to the other object*, and so it is implicitly unified with that other object.

We have now thought through the conceptual determinacy of the category of mechanism, and we have seen that this category is unsustainable in its own terms. Out of its own immanent dialectic, a dialectic generated by thinking through the contradiction that mechanism is, a new category more properly characterized by chemical determinacy has been generated, to which we now turn our attention.

II. CHEMISM

In the sphere of chemism objects are implicitly unified but are explicitly mutually external, even though they are no longer mutually indifferent. The contradiction of chemism lies in the fact that chemical objects are unified in their universal determinacy as objects and simultaneously held apart because of the same determinacy. Implicitly, however, the unity of objects is precisely their oppositional tension, i.e. objects are unified in that each is what it is through the other and so each is inseparable from that other. Explicitly there are two objects opposing each other; implicitly they are unified through their opposition. The unity is thus intrinsically negative—each is what it is by not being the other, and so it needs that other to be what it is.⁶⁹ The tension between the implicit unity of objects and their explicit mutual opposition (which *is* their implicit unity) generates the movement that chemism is.⁷⁰

Because initially the unity of objects appears to be immediately distinct from the dynamic opposition of the same objects, to have one is to negate the other. In other words, the oppositional tension is not initially seen as itself *being* the unity but rather appears to be *neutralized* through the association of objects in unity. This neutrality, however, since it is a unity that is only unified through oppositional tension (i.e. a negative unity), can only appear neutral by *excluding its own negativity*. But then it appears as *opposed* to a negativity (implicitly its own), and therefore has collapsed back into oppositional tension, itself again immediately distinct from neutrality. This sets up a seemingly endless oscillation of these two processes back and forth into each other, and is what Hegel takes to be the

69. Because of this oppositional tension, chemism in certain respects replicates a determinacy characteristic of the logic of essence. The difference however between chemical opposition and the opposition that characterized the sphere of essence is that in essence any apparent self-subsistence was illusory, whereas the oppositional tension in chemism establishes the self-subsistence of mutually external objects. This is due to the fact that the fully developed conceptual determinacies of universality, particularity, and individuality that entered into the sphere of objectivity and constituted the self-subsistent character of the latter are operative here in the modified form of the mutual oppositional tension of chemical objects. The self-subsistence of chemical objects, then, entails a certain non-indifference in their interrelation.

70. In this sense we might say that the much-celebrated Heraclitean "unity of opposites" is an ontologized chemical determinacy.

ontological underpinnings of certain basic chemical processes in nature. Chemism is the oscillation between these two moments: the unity which neutralizes oppositional tension but which, due to its own character as a negative unity, collapses back into oppositional tension again.

However, what is significant is that the oppositional tension we wind up with here is not merely given in advance as it was at the beginning in which chemical determinacy appeared out of the collapse of mechanism. Rather, the oppositional tension we now have before us, and which defines the basic character of chemical process, is one that has been posited by the chemical process itself. To put it another way, the *chemical* process has now actually brought about the oppositional tension that defines it in contradistinction to the beginning where oppositional tension first appears through a *mechanical* process. In this way, the chemical process posits its own presupposition, viz. the oppositional tension of mutually external objects that defines it. Drawing out the full implications of this will reveal a determinacy that has thereby gone beyond anything that can be strictly characterized as chemical.

The negative unity implicit in the chemical process, and through which it is the process that it is, is now more explicitly self-positing or self-mediating—it has become *explicit* self-determination. In other words, what is now becoming increasingly explicit is that the very *externality* of the object in its determinacy is itself *posited* by the concept, i.e. by the self-mediating movement that the concept of chemism is. Or to put it another way, the chemical process *itself* is now understood to give rise to the determinacy of mutually external chemical objects which enter into that process. The process thus no longer seems to be conditioned by anything external—that is, it is not conditioned by an externality that is not itself posited by the process itself. This does not mean that externality just goes away. Rather, we are beginning to see that externality itself is an integral part of the self-determining movement that the chemical process is. In other words, the *very determinacy of externality itself* can no longer be seen to be conditioned by something external (e.g. as it was when such determinacy required an essence outside it in a center or another object to which it could be opposed, as in mechanism and initially in chemism respectively). Externality itself is no longer immediate but rather is something mediated by its own process, viz. it is self-mediating.

There might still appear to be an immediate externality in the mutual externality of the two sides of the process: neutral unity and oppositional tension. But this mutual externality is unsustainable in that these two sides reciprocally negate each other—neither can subsist independently of the other insofar as each can only be what it is in and through the other. This means that the immediacy whereby they appear as mutually external collapses, revealing the unity to be a negative unity *of* oppositional tension. The unity is thereby explicitly posited as negative. However, with the collapse of this mutual externality, there is no externality left to appear as if it were conditioning the whole thing from the outside. In other words, it is no longer possible to posit an external determiner for the determinacy present here—namely, for the determinacy of externality itself.

Thus at this point the process explicitly shows itself to be a self-determining movement through *positing externality as a necessary aspect of its own process*. In other words, the process posits its own presupposition, externality, by means of which it achieves unity with itself through the negation of the apparent immediacy of that externality. The presupposition that it posits is precisely the very externality whose fate we have been following, and it posits such a presupposition, and must so posit it, in order to be the chemical process that it is. The status of externality is hereby altered: it is a necessary aspect of the self-determining process but is no longer the predominant determinacy. Rather than the process reducing to the determinacy of externality, the latter belongs to the former without exhausting it. In Hegelese we might say that externality is now merely a “moment” of the process. Or perhaps better way to put it would be simply to say that externality is now an *underdetermination* of the process rather than a hegemonic determiner.

But insofar as the chemical process posits its own presupposition in order to be the chemical process that it is, this “in order to...” indicates a relation that is no longer conditioned externally and so is not *driven mechanically* to be what it is. Or to put it another way, in positing the determinacy of externality through which it is what it is, the “through which” indicates a different sort of relation, one that might be better characterized as a *means to an end*. Externality turns out to be the *means* whereby the process is what it is, and in this sense the latter has become explicitly self-determining. In positing externality as the means whereby it achieves its own determinacy, the whole process at this point shows itself to be *purposive* rather than being mechanically *driven*. A *teleological* relation has emerged.

Here we might recognize the ancient Aristotelian sense of purpose as *heneka*, which is simply a preposition meaning “on account of,” or “for the sake of.”⁷¹ The process is now seen to posit externality *so that* it can be the chemical process that it is. But in being the chemical process in *this* way, it is no longer merely chemical but has become purposive. It is a purposive self-determination that posits its own presupposition—externality—as a means of its own realization, and is thereby freed from externality. There is no place left for externality to come along and condition the movement from the outside, and so there is no place left for mechanism *as a determining category*. Because of its indifferent externality, mechanism was powerless to posit its own presupposition, and it could contain no sense of an “in order to” or a “for the sake of.”

Chemism has become “purpose” or “end,”⁷² an explicitly self-determining process for which externality counts as a mere means, and thus it is no longer reducible to mechanical or chemical determinacies insofar as 1) it cannot be exhaustively accounted for in terms of the latter, and 2) the latter has shown itself to be unsustainable in its own terms. The whole process is no longer seen to be driven from behind, as it were.

71. Cf. for instance Aristotle, *Parts of Animals*, 641b25.

72. Miller translates Hegel's word *Zweck* as “end,” but due to the ambiguity of that English word I prefer to use “purpose.” The latter has ambiguities of its own, of course, and we must avoid thinking that we're talking about a particular purpose with empirical content and remain focused on the purposive relation or purposiveness per se (a distinction perhaps more legible in the German *Zweck* as opposed to *Ziel*).

However, if the self-determining process is not driven from behind, then it is no longer a mere fanciful projection to say that it “freely” determines itself from out of itself. It now *moves toward*... rather than being *pushed*. There is no longer an immediate externality which can appear to stand outside the process and condition it. Every sense or nuance of meaning in the concept of “externality” is now contained within the process as the means through which it is what it is, and so there is nothing to prevent the legitimate conception of a process whose purpose is to realize itself through a means. In fact, such a conception has now been rendered logically necessary.

The only way we can object to the legitimacy of the idea of purposefulness here is by tacitly positing an immediate externality at some level. In other words, the only way purposiveness can be denied is by insisting upon indifferent externality in its formal abstraction—that is, by *not* thinking it *as such* but by just believing in it, as it were, and thereby regarding it as a basis or positing it as a grounding determinacy. But that would only throw us back to an earlier determinacy—which would in turn lead us right back to purpose if we thought it through. This conception of purpose requires no “homunculus,” no covert “ghost in the machine,” and it has been determined strictly “from the bottom up” insofar as no external reflection came along and simply posited it, and also insofar as we began with the very determinacy of mechanism itself. The immanent logic implied by the category of mechanism itself, according to Hegel’s development of it in the *Logic*, thereby brings us to see that teleology is not a “seemingly purposive behavior” which conceals mechanical forces at work behind it, as per Mayr’s account, but rather is the truth of mechanism itself. It is to the development of teleology that we now turn.

III. TELEOLOGY

Initially the means, external objectivity, appears to be outside the self-determining process that is now seen as purposive. True, external objectivity does not *determine* the process to be what it is as it did in chemism and mechanism, but in being posited by the movement as its means it still appears to be external to purposive activity or the teleological relation. In other words, the end or purpose achieved by purposive activity is not itself identical to the means, and so means and end are mutually external. The means is something *used by* the teleological relation but is not *identical to* the teleological relation itself. Hegel refers to this shape of the teleological relation variously as subjective, finite, or external purposiveness.

What is immediately manifest is a contradiction between form and content. The *form* of the teleological relation is what Hegel calls “infinite” self-relation insofar as externality is posited by that activity as a necessary part of its own process so nothing can externally condition it. The “infinite” initially appears in the logic of being as the structure of finitude in which its limit, which defines it as limited and therefore finite, does not bring about its demise but rather gives it the determinacy that it positively is, and therefore we have a structure that remains itself in and through its limit. Such a structure that encounters itself at its limit cannot be said to be limited by something else

insofar as its very determinacy is the limit. Hence nothing outside it can limit it and therefore it is “infinite,” not in the sense of the “bad infinite” that is always “beyond” the finite and so is itself finite (insofar as it excludes the finite from itself and is therefore limited by an exterior determinacy) but in the sense of an infinite whose infinity is achieved precisely through the limit that is simultaneously its finitude.⁷³

The modified form of this structure can readily be seen in the teleological relation insofar as the externality that initially seemed to condition it externally is, in its very externality, posited by the teleological relation itself and so does *not* condition it externally. In other words, in externality the teleological relation only encounters itself—what it must put there to be what it is—and therefore is an “infinite self-relation.” But the problem is that the *content*, the external objectivity used as a means for purposive activity, does not *itself* appear as such an infinite self-relation. Rather, the means appears as something that is indifferent to the teleological relation and so can be subsumed by it. To put it another way, the *purpose* of purposive activity is external to external objectivity, the means, which is thus limited and finite. The determinacy of objectivity as indifferent externality has shown itself to be purposive (and so not merely indifferent externality) through the development of its own immanent dialectic, a movement generated by the contradiction that it is. The teleological relation, then, is the truth of external objectivity; but as such, it appears to be something external *to that externality whose truth it is*. So the teleological relation is initially a contradiction between its own form and content.

Now insofar as the means appears as something merely on hand and taken up by a purposive activity whose ends are external to it, *this* externality of the means to the purposive activity that makes use of it does *not* explicitly appear as something posited by purposive activity. Rather, external objectivity appears as something *there already*, i.e. as something presupposed or pre-positing (*vorausgesetzt*). But it must be kept in mind that the teleological relation is the self-superseding movement that external objectivity—the mechanico-chemical sphere—has shown itself to be, and so is nothing apart from that sphere. Hence insofar as the teleological relation is external to the mechanico-chemical sphere it is external to itself.

But upon closer examination it can be seen that inasmuch as the very *externality* of the means *to* purposive activity is that *through which* purpose is purpose, the very character of the means *as* external is *not* external to purposive activity. The very determinacy of an object is nothing other than its character as a means, and so it cannot be just external and indifferent to purposive activity. That is, the very externality of objects to purposive activity is exactly what intrinsically suits them for purposive activity. Thus external objectivity no longer appears to fall outside purposive activity but is posited in the means *as external* by purpose itself. The teleological relation thereby posits its own presupposition whereby it can be purposive in the first place. In other words, external objectivity’s very being-outside-purpose is made necessary by purposive activity in order for it to be the purposive.

What thus becomes explicit is that in the very externality of the means to purposive

73. For the full development of this argument, see Hegel's *Science of Logic*, pp. 136ff.

activity, the latter is only uniting with itself. Purposive activity shows itself to be identical to the self-superseding process of mechanism in general, except that rather than resulting from the dialectic of previous categories, that self-superseding process is now posited by its own activity. In other words, it is now self-positing.⁷⁴ External objectivity only *seemed* to be something external to purposive activity—the very indifferent externality of the mechanico-chemical sphere itself is *nothing other than* the activity of the teleological relation realizing itself as purposive. In this way the seeming externality of the means to the purposive activity that makes use of it is negated. The form and the content of the teleological relation are beginning to coalesce.

However, it still appears as if the teleological relation *allows* the mechanico-chemical process to transpire, only thus realizing itself as purposive. Mechanism is intrinsically the realization of the teleological relation, but the latter has to “allow” it to be that. Because of this there still appears to be a vestigial distinction between mechanism as a self-superseding process that yields the teleological relation on the one hand, and the teleological relation that makes of mechanical process the means of its realization on the other. This is the final shape that “external purposiveness” takes.

Here we have to keep firmly in mind the character of the determinacy of external objectivity as it has shown itself up to this point in the logical development. When we do so, we must remember that insofar as external objectivity has shown itself to be a self-negating process, it cannot stand on its own independently of the teleological relation which is its truth (i.e. which is *its own* determinacy rendered explicit). Therefore the cancellation of externality through the teleological relation is not really the cancellation of *externality* as such—indifferent externality is *already* explicitly posited as negated and as null in itself. Rather, the only thing than *can* be negated here is the *semblance* that external objectivity can be anything at all independently of the teleological relation. The *seeming independence* of external objectivity is both posited and canceled by purposive activity, and it is *precisely in this that its purposive character consists*.

However, once this semblance is canceled, then the teleological relation can no longer be seen as *allowing* the mechanico-chemical process to supersede itself, as if the former made use of the latter without being thoroughly identified with it. Rather, the teleological relation can only be seen as *being one and the same thing as* the self-superseding mechanico-chemical process itself. Only at this point do we get a full identity of the teleological relation and the self-superseding mechanico-chemical process, which means that only at this point do we get a full identity of form and content.

External objectivity itself is not negated; rather, its seeming independence from the teleological relation is negated. However, this means that external objectivity is restored

74. In each of the categories examined thus far—mechanism, chemism, and teleology—we have seen a similar development from the initial immediacy of its determinacy arising from a preceding category to an explicit positing of that determinacy through implications proper to that category's own determinacy. Each replication of this development, however, carries with it the further determinacy belonging to the category in question and is necessitated by that determinacy in its own way, and so once again we can see that it is a mistake to formalize Hegelian dialectic in terms of catch-phrases like *Aufhebung* or “thesis- antithesis-synthesis.”

in its fully objective character, but with this difference: the fully objective character of external objectivity is *identical to* the teleological relation. Only the semblance of its independence has dropped away. Nothing can make this objectivity seem to be other than purposive any longer. To put it another way, external objectivity is no longer merely a *means for* purposive activity—it *is* that activity. *End and means now coincide*. In this movement the teleological relation has fully objectified itself. The self-determining movement is what it is only in and as external objectivity. Such an objectified and externalized self-determining movement, such as the teleological relation whose objective end is itself, is the minimal concept of *life*.

IV. LIFE

A living organism is precisely the full identity of external objectivity and self-determining purposive activity. The full objectification of “the concept” is a process that posits and supersedes the semblance of independent externality, and is the process Hegel calls the “idea,” of which life is the initial form. The idea’s process indicates *a movement that is its own result*. External objectivity is not first “there” and then subsequently made into a moment of living process—this would be to tacitly posit an immediate externality outside the self-determining movement (as external purposiveness does), and all such externality, in every one of its guises, has shown itself to be nothing outside the self-determining movement. Rather, external objectivity from the first—in every sense of its immediacy—is the externality *of* purposive activity. Hegel’s text enables us to think the structure of such a mediated immediacy without separating the moments and tacitly positing an immediacy as first “there” or a mediating structure as first “there” (and so itself immediate). Both immediacy and mediation are given their due.

Now insofar as life is purposive activity which is fully unified with external objectivity in being is its own end, it is *external objectivity that has become self-related*. This is what life is. What constitutes life, then, is neither something “inside” the externality of a bodily mechanism (a “ghost in the machine”) nor is it *mere* externality (as in mechanism conceived in its abstraction), but rather is *the self-relation of* externality. This self-relating externality is embodied life, the living organism.

CONCLUSION

If the Hegelian account of these categories presented here holds good, we can see that both vitalism and mechanism are false alternatives for thinking life. Vitalism attempts to posit a “ghost in the machine” and, aside from the objection that this positing is done by a reflection external to the phenomenon itself, what we can see from our present standpoint is that vitalism fails to think the full identity of self-determining activity (the “soul” or “vital principle” of self-movement) and its external objectivity (the machine in which it is posited). Against any reductive mechanistic position, on the other hand, we can charge that it fails to think the very mechanism it is supposed to represent, for if it did think through its own mechanistic categories it could no longer call itself

mechanistic. It is precisely by thinking the mechanical *in every sense of its purely mechanical determinacy* that we are led inexorably to the thought of life. Life cannot be conceived in terms of the sheer indifferent externality of mechanism—not only because mechanism is merely inappropriate but because it is *self-undermining*, and it shows itself to be an *intrinsic* nullity whose truth is not mere indifferent externality but rather is the *self-relating externality* that a living organism is.

Thus externality itself, in every sense of its sheer externality, is a mere aspect of living process rather than its *ground* or *basis*. To put it another way, the determinacy of mechanism as indifferent externality is an underdetermination of living process, but cannot be a hegemonic determinacy that fully explains what life is. The only way we can remain reductive mechanists is by holding on to mechanistic categories in their abstraction. But by the same token, the only way we can remain vitalists is by doing the same thing insofar as vitalism leaves mechanism intact and simply tries to add something to it.

Hegel's contribution is thus important even for those who already regard the denial of teleology as mistaken or who already regard mechanistic reduction in general as passé—as we all know, it is not just the conclusions that are important but the reasons for them. Any philosophical project that attempts to overcome mechanistic reduction without undertaking the labor of thought in rendering explicit every implication contained in the standing contradiction that indifferent externality is—in short, any philosophical account that avoids thinking mechanism itself in its abstraction—will wind up leaving mechanism intact at some level. This will in turn provide a standing invitation for the reductive mechanist to enter.

Such an entry can be seen in the position of Michael Simon,⁷⁵ a philosopher of science who, in a reductive account of “emergence,” exemplifies the previously mentioned fixation upon mechanistic categories. Initially misconstruing emergence as indicating a mere inability to predict an outcome, he then goes on to suggest that “emergence presents a special problem for biology only if the relationship between biological and physical or chemical properties is fundamentally different from that between physical and chemical properties.”⁷⁶ This fundamental difference is precisely what we can now maintain if Hegel is right in his account of the development from mechanism to chemism, chemism to teleology, and teleology to life.

But because he has not thought through mechanistic categories in their abstraction, Simon denies that this fundamental difference can be maintained, and so he can only conceive of “emergence” as a new configuration that is either predictable or not. If predictable, then there is no real emergent novelty insofar as such “emergence” is thoroughly explainable in terms of laws that govern objects on a lower level. If not predictable, then it cannot qualify as a scientific phenomenon. Thus he claims, “A property is either ultimately intelligible within the framework of the laws and theories

75. Michael A. Simon, *The Matter of Life; Philosophical Problems of Biology*, New Haven, Yale University Press, 1971.

76. *Ibid.*, p. 156.

concerning the level from which it may be supposed to have emerged, or it is not.”⁷⁷ If it is, then it is not emergent; if it is not, then it is no more emergent than a divine miracle that simply interrupts a natural process from without.

Simon hypothetically conceives of a combination of *A* and *B* that produces *C*, where *C* either reduces to the properties of *A* and *B* or would constitute evidence contrary to the physico-chemical theory in terms of which *A* and *B* were previously understood. But what he cannot conceive of is the possibility that *A* and *B* through their own process are self-negating in such a way that, through the emergence of *C*, *A* and *B* are no longer what they were, and so are not immediately “there” as determinative substrates but are transformed into *underdeterminations*. To put it another way, the kind of theorizing exemplified by Simon cannot conceive of self-determination, but remains foundationalist in its representations—it always seeks a ground or basis that maintains itself as an unchanging determinacy or a hegemonic determiner. So also, Simon conceives of organic self-regulation as explicable in terms of either a) known physical principles, b) physical principles as yet undiscovered, or c) non-physical principles. The latter, for him, can only be “spiritualism” or “vitalism” and so are dismissed.⁷⁸ Omitting alternatives in a list presumed to be exhaustive and then “refuting” a position on that basis is of course fallacious in any case.

But apart from the fact that Simon has set up the terms in such a narrow way, from the standpoint achievable through the *Logic* we can positively assert an alternative not entertained by Simon nor by reductive mechanists (or “physicalists”) in general: that life is neither *reducible to* physical principles nor is it a *non-physical* structure, as if it were *opposed to* physics. The only way life could be *opposed to* the level of the purely physical would be by maintaining the “purely physical” as a sphere of indifferent externality immediately “there” outside and independent of self-determining movement, that is, by not thinking the self-supersession of indifferent externality—that is, by not thinking mechanistic determinacy as such. Simon apparently has difficulty imagining mechanism *not* somehow remaining, either as a basis, a refuted theory, or a sphere to which is opposed a quasi-spiritual vitalism that is unrelated to it. For him, either something is compatible with physical mechanism, in which case it is fully explicable in its terms, or it is incompatible with it, in which case it is dismissed as unintelligible.

Hegel’s account of life is neither incompatible with mechanism nor reducible to it. Externality does not simply get negated in life—this would be to think of life in *opposition to* mechanism and so to preserve the immediacy of both. Furthermore, insofar as in the latter conception the physical and the biological spheres are regarded as immediately *external* against each other in this way, they are both *still tacitly being thought mechanistically*. In Hegel’s account, mechanism does not just go away; it becomes an underdetermination within living process, an underdetermination which when represented as the sole sphere of determinacy in relation to life is an abstraction, and for this reason determinacies appropriate to life are neither incompatible with mechanism nor reducible to it. It is an

77. *Ibid.*, p. 159.

78. *Ibid.*, pp. 152-153.

alternative overlooked by reductive mechanists, within both the empirical sciences as well as in philosophy, who generally do not critically examine their own categories as such in abstraction.

Indeed, it is likely that Hegel's alternative will continue to be overlooked so long as we stick to empirical observations and merely "apply" concepts to them without systematically deriving our categories from a presuppositionless beginning. If we undertake the latter project, however, the generation of different ontological levels, each irreducible to previous ones, loses the appearance of arbitrariness. David Hull, for instance, can only see ontological levels as arbitrarily introduced by external reflection, remarking, "It is difficult to discover how one decides where and how many additional ontological levels to introduce. Why not introduce them for the evolution of every species, for the emergence of star systems, or the development of the corporate state?"⁷⁹ Behind all ontological levels, for him, there lies the epistemological stance of a consciousness external to the phenomena in question.

What Hull does not conceive of is a possibility Hegel purports to carry out—viz. that of a thoroughly immanent account of categories. Hence it's not surprising that Hull ultimately does not see any grounds for the uniqueness of biology.⁸⁰ In the difference between biological and purely physical phenomena he is only willing to acknowledge a difference in degree, not in kind.⁸¹ Hegel shows us that this difference can be specified at an ontological level, and indeed only at an ontological level, not an empirical one, and furthermore that this difference is not a mere diversity of heterogeneous spheres that are simply juxtaposed. Thus an immanent and systematic derivation of ontological categories, an approach like that outlined by Hegel in the *Science of Logic*, can provide legitimate philosophical grounds for the uniqueness of the life sciences, the autonomy of biology with respect to physics, and the radical irreducibility of life to mechanism.

Wendell Kisner, Ph.D.
Athabasca University

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79. David Hull, *Philosophy of Biological Science*, New Jersey, Prentice-Hall, 1974, p.130.

80. For an account of five arguments supporting the thesis that the biological world is irreducible to a purely physico-chemical analysis, all of which are found wanting in varying degrees and none of which consider an Hegelian type of immanent derivation, see also Michael Ruse, *The Philosophy of Biology*, London, Hutchinson & Co. LTD, 1973, pp.209-217.

81. Hull, *Philosophy of Biological Science*, p. 133, 135.

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