

**raymond ruyer and the
metaphysics of absolute
forms.**

**raymond ruyer, *neo-finalism*,
trans. alyosha edlebi
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In 1974, the French philosopher of science Raymond Ruyer (1902-1987) published a book entitled *The Gnosis of Princeton: Scientists in Search of a Religion*, which purported to present the esoteric ideas of an influential but secretive group of scientists working at several prestigious American universities during the 1960s and 1970s.¹ The premise of the book, however, was a deliberate ruse, a fiction. Ruyer had invented the subterfuge of an imaginary group of gnostic thinkers working at Princeton and elsewhere to present his own ideas and make them accessible to a wider public, laying out a new perspective on science and a new articulation of the relation between matter and mind. The stratagem turned out to be a consummate success: the book became an immediate best-seller, and the French media dubbed Ruyer “The Sage of Nancy,” after the city in eastern France where Ruyer had spent most of his life.²

If *The Gnosis of Princeton* gave Ruyer a public acclaim that had hitherto eluded him, he had nonetheless already enjoyed a stellar if somewhat idiosyncratic academic career. He trained at the prestigious École Normale Supérieure in Paris, and received the highest mark in the 1924 *agrégation* exam in philosophy. Mobilized during WWII, he was a prisoner of war at the Oflag XVII-A camp in Germany from 1940 to 1944, where he wrote his influential book, *Elements of Psychobiology*.³ In 1947, he was appointed Professor of Philosophy at the University of Nancy, where he taught until his retirement in 1972. He declined an offer to move to the Sor-

bonne, preferring to remain in his beloved Lorraine region, where he maintained contacts with numerous scientists. His last book, *The Embryogenesis of the World and the Silent God*, was published posthumously, in 2013.⁴ In the four decades of his active career, Ruyer published over twenty books, and his works had a decisive influence on thinkers as diverse as Georges Canguilhem, Gilbert Simondon, and Gilles Deleuze. Throughout, he remained a singular thinker who shunned the well-trod currents of twentieth-century French thought such as Bergsonism, phenomenology, existentialism, Marxism, structuralism, even though he remained in dialogue with all of them.

It was no doubt Ruyer's fierce against-the-grain independence that consigned his work to an initial obscurity—despite the success of *The Gnosis of Princeton*, by the end of the century, all his works were out of print. In the past few years, however, there has been a strong resurgence of interest in Ruyer's work. In 2012, Presses Universitaires de France (PUF) reissued Ruyer's 1952 book *Néo-Finalisme*, considered by many to be his masterwork. The reissue appeared in PUF's influential series *MétaphysiqueS*, which, significantly, is edited by a new generation of younger French philosophers—Élie During, Patrice Maniglier, Quentin Meillassoux, and David Rabouin. In 2014, *Néo-Finalisme* was included in the French *agrégation* exam in philosophy, marking its establishment as a semi-canonical text, and in 2016 the University of Minnesota Press published the book in a superb English translation by Alyosha Edlebi.⁵ One of the primary factors motivating this revival, to be sure, is the work of the Gilles Deleuze, who was deeply influenced by Ruyer, and made frequent reference, in particular, to *Neofinalism* and *The Genesis of Living Forms* (1958).⁶ The publication of Edlebi's translation is thus doubly important, since it will not only allow scholars to explore Deleuze's indebtedness to Ruyer, but will hopefully restore Ruyer to his rightful place as one of the most important French philosophers of science of the twentieth-century.



Deleuze always insisted that the power of a philosophy must be measured by the concepts it creates, and the new set of divisions these concepts impose on things and actions. This is certainly true of Ruyer's work, and especially *Neofinalism*. In place of the distinction between the organic and the inorganic, Ruyer proposes a new distinction that cuts across both these domains: a distinction between *absolute forms* (individual beings), on the one hand, and *molar structures* (aggregate or mass phenomena), on the other.⁷ Absolute forms include molecules, viruses, cells,

embryos, and brains, while molar structures are statistical aggregates of these individual forms, such as clouds, gases, crowds, or geological formations. This distinction in turn entails a new distribution of the sciences, since the primary sciences will be those that deal with absolute forms, while the sciences that only study individuals from their molar or statistical side will be relegated to a secondary status.

For Ruyer, like Bergson and Deleuze, the role of philosophy was to create a metaphysics adequate to contemporary science. Ruyer suggested, however, that there are two tendencies that tend to thwart this project: we tend to interpret the nature of physical beings from either *visual sensations* or *human activity* (technics) (NF 143). On the one hand, to “observe” a physical object is another way of saying that one’s retina (or a photographic plate, or another piece of laboratory equipment) is the locus of the impact of photons emanating from the object. But observation does not necessarily give us knowledge of the object. Put simply, I can observe the circular appearance of a nebula, a rainbow, a solid metallic sphere, a soap bubble, or an amoeba at rest, but the internal modes of “bonding” in each of these cases is very different. The task of metaphysics is thus “to transform scientific observations into a knowledge of bonds [*liaisons*]” (224; cf. 104).

On the other hand, and perhaps more insidiously, we tend to interpret nature through the prism of our own technical artifacts. Seventeenth-century “mechanism” interpreted nature through a comparison with the “functioning” (147-8) of mechanical machines such as watches, levers, or pulleys. Today, many people appeal to information machines (computers) as models for the mind: the brain is the hardware, and the mind is the software, running different programs in different modules. Genetics, and the discovery of DNA, arose at the same time as the computer (both are informational), and, in the popular mind, when one says something is “genetic,” they generally mean it is “pre-programmed.” Most egregious, for Ruyer, is the appeal to the “building blocks” or “bricks” of the world (141): because we fashion our complex buildings out of simple bricks, we presume that the universe, with all its complexity, must likewise be built out of simple building blocks, such as atoms or particles—one of the reasons physics is still sometimes presented as the most basic of the sciences. “We continue to believe in a poorly defined primary of the molecular and the elementary,” with its concomitant presuppositions of reduction and analysis (155).

For Ruyer, this vision of the universe—a multileveled structure in higher levels “emerge” from a ground floor (matter, *Grund*, space-time) that alone is solid—is no longer tenable (141). As a way of approaching Ruyer, we might note that Deleuze, in a seminar on Spinoza, had argued that, in the analysis of matter, there are three possibilities for determining what constitutes the “simplest” body: the finite, the indefinite, and the actually infinite. The *finite* approach, which has inspired atomism since Epicurus and Lucretius, holds that the analysis of matter necessarily reaches a limit, and this limit is the atom or particle (the building block). The *indefinite* approach, by contrast, insists that, no matter how far the analysis is pushed, the term one arrives at can always in turn be analyzed and divided—in other words, there is no final or ultimate term (indefinite regress). The viewpoint of *actual infinity*, however, implies a double battle against both the finite and the indefinite. Against the indefinite, it insists that there are indeed ultimate or final terms that can no longer be divided, but against the finite, it insists that these ultimate terms are *actually infinite multiplicities* that cannot be divided further *without changing their nature*. In other words, one cannot speak in Spinozistic terms of a simple body as if it were a brick or a building block; rather, the simplest bodies in nature are themselves infinite multiplicities.⁸

Ruyer adopts a similar position in *Neofinalism*. The “simplest” terms in Nature, he says, are *absolute forms*, and the concepts he formulates in *Neofinalism* each indicate an inextricable aspect of such forms. An absolute form is a domain or multiplicity in constant *formation* that has an irreducible unity—a “being-together” (107)—characterized by a non-dimensional or *absolute survey* [*survol absolu*] of itself (94), which establishes *non-localizable bonds* [*liaisons*] between its constituent components, with their own *zones of overlapping* [*recouvrement*] or indetermination (108).⁹ Ruyer distinguishes absolute forms from *molar structures*, which are statistical and secondary composites of these absolute forms. Absolute forms include molecules, viruses, embryos, organisms, consciousness, and culture (externalized technics and symbolization). Molar structures include, for instance, clouds or gasses, which are composites of individual molecules; sedimentary limestone formations, which are an aggregate of individual mollusks (143), or crowds of human beings, which are collections of individual consciousnesses (84). This distinction in turn entails a new distribution of the sciences: the primary sciences are those that focus on absolute forms, while the secondary sciences are those that only study individuals from their molar or statistical side.



Deleuze called Ruyer “the most recent of Leibniz’s great disciples” because his absolute forms are the successors of Leibniz’s monads, though Ruyer conceives of them quite differently, and *Neofinalism* is filled with penetrating analyses of different types of absolute forms.¹⁰ Consider, for example, a water molecule. It is not enough to say that that water “consists” of two hydrogen atoms and one oxygen atom, since the molecule is marked by a zone of absolute survey in which the internal relations or bonds between the atoms become non-localizable (156), and the elements within the system lose their individuality (106). To speak of a domain of absolute survey is to speak of a domain of *internal bonds*.¹¹ “If there were no zone of overlapping,” Ruyer writes, “there would be no molecule at all” (108). The same is true of atoms, which are no less domains of absolute survey and activity than more complex molecules. Ruyer notes that quantum physics had already replaced the atom of matter with a quantum of *action* (161). “The old idea was that first of all a given piece of matter is what it is, and then, because it enjoys that permanent and unchanging nature, it acts on various occasions in various ways.”¹² In the new concept, what an atom *is* is the same as “*doing what it does*” (148). In Ruyer’s language, an atom is a *formation* and not a *functioning*: “an atom is not a fully assembled mechanism that functions. It is incessant activity, it is continually ‘forming itself’ in ‘a certain prolonged rhythm of activities’” (147, 149).

The same is true of even the simplest living being, which “is never ‘fully assembled’; it can never confine itself to functioning, it incessantly ‘forms itself’” (147). Every cell, Ruyer notes, “has to be an absolute form with self-survey to control the beginning of its own division, progressively diminishing the unity of the system for the benefit of the individuality of its components” (109). One of Ruyer’s recurrent examples on this score are unicellular animals such as the amoeba. An amoeba digests food, even though it does not have a digestive tract; it reacts to its environment, even though it does not have sense organs or a nervous system. Lacking such organs, the amoeba is nonetheless capable of “unified” behavior—self-direction, conditioned reflexes, habits, learning, adaptation, instinctive habits, and so on.¹³ One could say that the amoeba has its own subjectivity, a “primary psychism,” which is another way of saying that it is a form-in-itself.¹⁴

When Ruyer considers the relation between molecules and cells (or between the inorganic and the organic, in the usual parlance), he writes: “The emergence of life, considered as an absolutely novel mode of being, is no longer a philosophical problem. There is no longer any reason to believe that from a chemical molecule to a bacillus, the abyss is greater than from a bacillus to a vertebrate” (154). Writ-

ing in the 1950s, Ruyer observes that numerous physicists—Bohr, Jordan, de Broglie, Schrödinger—had already had their say on the problem of life, even though Ruyer remained critical of certain works in this genre such as Schrödinger’s classic *What is Life?*.¹⁵ Nonetheless, Ruyer notes that Schrödinger’s theory of a generalized molecule is not that different from Whitehead’s seemingly opposite theory of a generalized organism, since both insisted on lines of continuity between individual forms (156). To affirm that microorganisms are molecules is to affirm, at the same time, that molecules are microorganisms—or rather, that both are absolute forms.

■

But perhaps the most probing analysis Ruyer provides in *Neofinalism* is found in the chapter entitled “The Brain and the Embryo” (45-67), in part because Ruyer’s analysis approaches these two domains of absolute survey through the somewhat unusual prism of *technology*. It has often been argued—by Leroi-Gourhan, for example (20-21)—that technical objects are “prosthetic,” that is, they are extensions of the body or “externalizations” of the organs. A hammer externalizes the forearm and fist in wood and iron; clothing externalizes the skin; a baby’s bottle externalizes the mother’s breast; a kitchen stove externalizes the stomach; and so on. The evolutionary conditions that made such externalizations possible are tied to the morphology of the human body. In assuming an upright position (bipedalism), two of our own organs became “deterritorialized,” to use Deleuze’s language. Our front paws lost their faculty of locomotion and became *hands*, which are prehensive, and capable of doing many more things than simply walking (grasping, pounding, rotating, etc.). At the same time, the mouth lost its own capacity for prehension, which was taken over by the hand, but in the process it gained the capacity for *speech*. In other words, when the hand and the mouth were de-territorialized, they were simultaneously *re-territorialized* on new actions, primarily language (for the mouth) and tool-making (for the hand). It is not simply our large brains that give humans their specificity, since our brains would have had far less to do if our bodies did not have a mouth that speaks or hands that fabricate.

It is true that other animal species produced externalized technologies—spiders weave webs, beavers build dams, birds construct nests—but their technical activity seems to be directly derived from their genetic makeup as a kind of “extended phenotype.”¹⁶ What seems specific to the human species, by contrast, is that its externalized organs become *detachable*, removeable, separated from the body, to

the point where they enter their own evolutionary history. In a sense, evolution bifurcates: the human organism has been sculpted over thousands of years by an extremely slow-moving evolution, but these organisms in turn have produced externalized artifacts that connect together to create a new technological body, which is evolving at a faster and increasingly accelerated pace. But Ruyer develops this thesis in a new direction. In so-called higher animals, “functions” like digestion and thought become localized in specific organs such as the stomach and the brain, but clearly—as the example of the amoeba shows—the functions do not require the specialized organs.¹⁷ Ruyer drew the obvious conclusion: *bodily organs are themselves technical artifacts*; they are specialized “tools” that have been fabricated by the organism over the course of evolution. Ruyer thus distinguishes three levels of technicity: bodily organs as an originary technicity; externalized organs as an extended phenotype (webs, dams, nests); and the detachable artifacts that enter into a circuit external to the body. “Organic formation, instinctive external circuit, and intelligent external circuit” (33; cf. 20).

The consequences Ruyer draws from this analysis are immense. Most obviously, it explains the title of *Neofinalism*. Ruyer is not a traditional “finalist,” presuming a teleology or purpose throughout nature or for nature as a whole. Rather, he defends a “neofinalism” that begins, uncontroversially, with the presumption that humans act in a purposeful manner when they fabricate technical artifacts: we have a finalist aim in fabricating cooking utensils, which depend on mnemonic themes or senses that exist in a “transspatial” dimension (126-33). But here again, Ruyer draws the inevitable conclusions: what is true for *intelligent* behavior must be equally true of *instinctive* behavior. “It is impossible to recognize a finalist sense in the invention of cooking utensils and to deny it to the organs of ingestion, digestion, and assimilation” (19). In other words, neither consciousness, nor the brain, nor the nervous system has a monopoly over memory, habit, invention or signifying activity in general (37). Consider the fact that humans are currently attempting to fabricate an artificial brain or an artificial intelligence whose capacities may soon exceed those of human intelligence (the so-called “singularity”).¹⁸ Yet every human embryo *already* knows how to fabricate a human brain, as well as a stomach, lungs, kidneys, and a circulatory system. In epistemological terms, one could say that an embryo has a knowledge that exceeds that of the brain—a brain, moreover, that the embryo itself has created. If Ruyer sometimes calls the embryo our “primary organic consciousness” (38, 43-44, 72, 74, 100), it is because the creation of the body and its organs is the neo-finalist activity of the embryo, just as the creation of technical artifacts is the neo-finalist creation of the brain,

our “secondary consciousness” (73-4, 94, 98-99, 215). The equipotentiality of the embryo is prolonged in the plasticity of the brain.

But this is another way of saying that the embryo and consciousness, like molecules and cells, are absolute forms, with all their attendant characteristics: absolute survey, non-localizable bonds, zones of indetermination. It was in his first book, *Consciousness and the Body* (1937), that Ruyer began to analyze consciousness as a form-in-itself, and these analyses reach their culmination in the ninth chapter of *Neofinalism* on “Absolute Domains of Survey” (90-103), which is no doubt the crucial chapter of the book. Ruyer shows that my visual field is “surveyed” by consciousness without ever having to position itself at a distance from it (97). In other words, the details of perception are not linked to each other through causal links, like the parts of a machine, but are grasped in the immediacy of an absolute time-survey and space-survey, independent of any supplementary dimension (100). Philosophy has often considered consciousness to be knowledge, but for Ruyer, consciousness is primarily a domain of absolute survey and nonlocalizable bonds (107). It is the concept of absolute survey, Ruyer claims, that holds “the key not only to the problem of consciousness but also to the problem of life” (94). It is not an exaggeration to say that the pages where Ruyer develops his concept of absolute survey are among the most original passages in twentieth-century philosophy, and they merit close study. Nor is it by chance that Deleuze and Guattari, in *What is Philosophy?* (1991), presented philosophical concepts as absolute forms in the Ruyerian sense, thereby adding concepts to the continuity of individualities that populate the universe.¹⁹



It would be tempting to characterize the metaphysics that Ruyer develops in *Neofinalism* as *pan-psychist* (everything is consciousness) or *pan-vitalist* (everything is life). Ruyer himself sometimes has recourse to such language, as when he calls the embryo, for instance, a primary consciousness. In making such links, Ruyer would certainly be in good company, since others have taken the organism or life as a model for metaphysics. Whitehead, who exerted a strong influence on Ruyer (second only, perhaps, to Samuel Butler) called his process philosophy a “philosophy of the organism,” and Deleuze appropriated the tradition of vitalism when he spoke of “non-organic life.” But such characterizations miss the true radicality of Ruyer’s thought. “It would be obviously absurd,” he insists, “to imagine that a molecule’s mode of unity is the same as an organism’s.”²⁰ The differences between the two are manifest, and Ruyer’s deeper claim is that they both share in

a common problem: “the primary mystery of the form-in-itself” (110). They are both individualities or forms that persist and reconstitute themselves in a self-forming activity. The point of Ruyer’s philosophy, as he himself says, “is not to define the atom, the molecule, and the physical individuality as organisms or as psychological consciousnesses, but instead to see what is schematically common to the molecule, the organism, and consciousness. In all these cases, the common schema is a domain of *absolute survey* and *activity*” (162). Ruyer’s work thus implies an entirely new philosophy of nature, which in turn implies a reconception of the role of the various sciences in exploring nature.

Most generally, it does away with an obsolete vision of science, inspired by Auguste Comte, which presumed a hierarchy among the various sciences, with physics as the base, followed by chemistry, biology, and the human sciences. Already in his early work, *Elements of Psychobiology* (1947), Ruyer demonstrated that what the sciences show us are not levels, but rather *lines of continuity* between absolute forms or individuals.²¹ In *Neofinalism*, Ruyer calls this a “fibrous” conception of the universe (140-153) that follows the lines of continuity between molecules, viruses, organisms, and consciousnesses.²² The fibrous universe envisioned by Ruyer poses a fundamentally new problem for the sciences, namely, how to *differentiate* between absolute forms along these line of continuity. Ruyer gives passing hints on how he might have pursued this still-nascent project in *Neofinalism*, which revolves around that status of memory. “The main difference, no doubt, between physical beings and the most complex organisms does not derive from the instantaneity or the absence of memory in the form, but from a lack of *detachment* of this memory” (149). It has often been noted that, for the human species, the invention of the technology of writing was an externalization of memory: information could be henceforth stored in documents (and, now, computer files) rather than being retained in the brain.²³ Likewise, in supposedly lesser organisms, “organic memory [genetics] constitutes specific potentials that can be reincarnated in innumerable individuals” (149), even in the self-replicating reproduction of viruses. What seems unique about physical individualities, by contrast, is that this semi-substantialization of activity into memory does not take place: atoms are “uninterrupted activity” that “lack a detachable memory” (151-2). Indeed, “they have no need for one, because they never have to take up again the thread of their uninterrupted activity” (152). This theme of the *detachment of memory*, as a criterion for differentiating among absolute forms, is an ongoing project that Ruyer has bequeathed to subsequent thinkers.

More specifically, as we have seen, Ruyer's work implies a new distribution of the diverse sciences based on the distinction between the *molecular* and the *molar*. For Ruyer, the fibrous line of continuity that links atoms, viruses, embryos, and brains is entirely "molecular" (Ruyer, to be sure, is giving this term a new concept), to the point where he can say that an elephant is a molecular, micro-scopic being, far more so than, say, a soap bubble (106). Much traditional science deals with the secondary and statistical *molar* relations between absolute forms. If we watched, from the air, a massive crowd of human beings moving through a city during a demonstration, negotiating their trajectory through streets and around obstacles, their motion would be entirely explainable by the laws of fluid dynamics, but these molar and statistical properties of the crowd would say nothing about the individual subjects, which are absolute forms capable of equipotentiality. Similarly, a sedimentary limestone strata can be described entirely in terms of its deterministic physical and geological properties, but nonetheless it cannot be confused with the individual mollusks of which it is made up (143). The mistake of many traditional sciences is that "they went illegitimately from 'molar' and statistical properties to individual properties" (143). The innovation of Ruyer's work in the philosophy of science will be to have shown the priority of the sciences that follow the fibrous lines of continuity between absolute forms, such as quantum physics (for molecules, atoms, and sub-atomic realities), biology and embryology (for uni- and multi-cellular beings), psychology (for consciousness) and sociology (for culture). The secondary sciences, some of which have hitherto been the privileged sciences, are those that only study individuals from their molar or statistical side, such as classical physics (e.g., thermodynamics), physico-chemical physiology, neuro-psychology, population biology (the mathematical study of the struggle for life) and classical political economics (crowd phenomena).

If Ruyer's philosophy ultimately cannot be characterized pan-psychist or pan-vitalist or even pan-physicalist, it is because the matter-life-consciousness hierarchy on which these characterizations are based on what might be said to constitute a "folk metaphysics" that is no longer supported by science itself. Neither matter, nor life, nor consciousness can be reduced to the other; all are absolute forms, at once spatiotemporal and transspatiotemporal (249). The fundamental line of demarcation in nature can no longer be drawn between the organic and the inorganic, or between mind and body, but must be relocated in the distinction between absolute forms, as unitary domains of action, and the molar aggregates into which they enter. These domains of absolute survey implicate "a *metaphysical* 'dimension'" of transspatial mnemonic themes that is "altogether different from the

geometric dimensions of space-time” (249), and it is the development of this new metaphysics that is Ruyer’s fundamental contribution to philosophy. Despite having been written more than sixty-five years ago, *Neofinalism* retains an extraordinary topicality and immediacy that makes it, even now, an essential contribution to the concerns of contemporary philosophy.

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NOTES

1. Raymond Ruyer, *La Gnose de Princeton: Des savants à la recherche d'une religion* (Paris : Fayard, 1974). A mass-market paperback edition of the book was issued in 1977 by Hachette in its "Pluriel" series. The book was succeeded three years later by a follow-up volume, *The Next 100 Centuries: The Historical Destiny of Humans according to the New American Gnosis*: Raymond Ruyer, *Les Cent prochains siècles: Le destin historique de l'homme selon la Nouvelle Gnose américaine* (Paris: Fayard, 1977).
2. For a more detailed analysis of The Gnosis of Princeton "affair," see Fabrice Colonna, "Retour sur une étrange affaire: « La Gnose de Princeton »,» in Fabrice Colonna, *Ruyer* (Paris: Les Belles Lettres, 1977), 13-28. Colonna's book is a superb study of the entirety of Ruyer's oeuvre.
3. Raymond Ruyer, *Éléments de Psycho-biologie* (Paris: Presses Universitaire de France, 1946).
4. Raymond Ruyer, *L'embryogenèse du monde et le Dieu silencieux*, ed. Fabrice Colonna (Paris: Klincksieck, 2013).
5. Raymond Ruyer, *Neofinalism*, trans. Alyosha Edlebi (Minneapolis: University of Minnesota Press, 2016). Pages references to *Neofinalism* are included in the text in parentheses.
6. Raymond Ruyer, *La genèse des formes vivantes* (Paris: Flammarion, 1958). An English translation, *The Genesis of Living Forms*, by Jon Roffe and Nicholas B. de Weydenthal, is scheduled to appear from Rowman and Littlefield shortly.
7. See Gilles Deleuze, *The Fold: Leibniz and the Baroque*, trans. Tom Conley (Minneapolis: University of Minnesota Press, 1993), 104, translation modified: "The great difference does not pass between the organic and the inorganic, but crosses both of them by distinguishing what is an individual being from what is a crowd or mass phenomenon, what is an absolute form and what are massive, molar figures or structures." On this distinction, see Ruyer, *La genèse des formes vivantes*, 54, 68.
8. See Gilles Deleuze, seminar of 10 March 1981.
9. See Ruyer, *Éléments de Psycho-biologie*, 23: A form-in-itself is "the immediate unity of a multiplicity of coordinated elements."
10. Deleuze, *The Fold*, 102, translation modified. Chapter 8 of Deleuze's book, "The Two Floors" (100-120) analyzes the relation between Ruyer and Leibniz.
11. Ruyer notes that atomic individualities have extraordinary binding energies, which is why the disintegration of an atom is much more violent than the disintegration of a human being (103).
12. Ruyer, *Neofinalism*, 148, citing R. J. Collingwood, *The Idea of Nature* (Oxford: Clarendon Press, 1945), 146.
13. Ruyer, *Éléments de psychobiologie*, 22-23. See also « Le paradoxe de l'amibe et la psychologie », in *Journal de psychologie normale et pathologique*, July-December 1938, 472-92 ; and « Du vital au psychique », in the collection *Valeur philosophique de la psychologie*, Centre international de synthèse (Paris: PUF, 1951).
14. See Ruyer, *Éléments de Psycho-biologie*, 23-24.
15. Ruyer, *Neofinalism*, 158-62. See Erwin Schrödinger, *What is Life? The Physical Aspect of the Living Cell* (Cambridge: Cambridge University Press, 1944).
16. See Richard Dawkins, *The Extended Phenotype: The Long Reach of the Gene* (Oxford: Oxford University Press, 1982).
17. This argument applies equally to plant life. See Stefano Mancuso and Alessandra Viola, *Brilliant Green: The Surprising History and Science of Plant Intelligence*, trans. Joan Benham; forward by Michael Pollan (Washington DC: Island Press, 2015). Plants are not "individuals" (in, "not" +

- dividuous, “divisible”), since even if a plant is cut in half, the two parts can still live independently (36), primarily because plants have not localized their life functions in organs (“they can see without eyes, taste without taste buds, smell without a nose, and even digest without a stomach,” 73)
18. See Ray Kurzweil, *The Singularity is Near: When Humans Transcend Biology* (New York: Penguin, 2005).
19. See Gilles Deleuze and Félix Guattari, *What is Philosophy?*, trans. Hugh Tomlinson and Graham Burchell (New York: Columbia University Press, 1994), 210, where they explicitly acknowledge that their analysis of concepts (in the first chapter of the book) has the exact same status as Ruyer’s analysis of the brain as an absolute form.
20. Ruyer, *Neofinalism*, 110. See also *Éléments de Psycho-biologie*, 2: “It would be artificial to put living species and chemical species on the same plane.”
21. Ruyer, *Éléments de Psycho-biologie*, 1.
22. See Ruyer, *Neofinalism*, 142: “Since quantum physics, it has become impossible to represent the universe—the real universe of individual beings—as made up of a series of superposed layers, the lowest bearing the others. The universe has, instead, a fibrous structure in time, and each fiber represents the continuous line of an individualized existence.”
23. See, for instance, Walter J. Ong, *Orality and Literacy: The Technologizing of the Word* (London: Methuen, 1982).