

-Call for Papers-

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DIALECTICS AND LIFE

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Is There Life on Marx?

What can we learn about life if we adopt a Marxist perspective? How can current knowledge and research on biological systems help contemporary Marxist philosophy? What is the relation between Marxism and the life sciences?

The concepts that link Marxism and the life sciences most directly and productively, creating a common ground of exchange, are “dialectics” and “life”. It is this point of contact we propose to examine, historically, philosophically, and scientifically. The decisive vantage point is one of mutual correction. Marxism’s political-epistemological questions — including the social conditions under which the life sciences operate and how “life” is scientifically conceptualised, framed, and instrumentalised — open a critical perspective on the conceptual frameworks and research programs of biology itself. Conversely, current biological knowledge and practice challenge and potentially revise Marxist categories. Dialectics, as a process-relational logic, is the hinge of this exchange: whether it analyzes a change in a structured entity of reality, a methodological approach, or a critical practice of thinking about the roots of changes, the question of what it can and cannot do in dialogue with the contemporary life sciences is one this special issue sets out to answer.

What is life?

This question could first be raised scientifically in the early nineteenth century, when a boundary between the living and the non-living emerged. The tradition on which Marx and Engels drew apart from the scientific developments they were witnessing (e.g. Darwinism, thermodynamics etc.) was the natural philosophy of Kant, Hegel, Schelling, and the Romantics, as well as Goethean morphology — frameworks they engaged critically alongside the French materialist tradition (Diderot, d’Holbach) and the materialisms of their own contemporaries.

Engels explicitly addressed the problem and proposed a definition of life. The most fully developed version of his idea appears in the notes to his *Dialectics of Nature*: “Life is the mode of existence of protein bodies, the essential element of which consists in continual metabolic interchange with the natural environment outside them, and which ceases with the cessation of this metabolism, bringing about the decomposition of the protein.” A closely related but more internally focused formulation — emphasising the “constant self-renewal of chemical constituents” — appears in *Anti-Dühring*. Both texts define life not by a fixed substance but by a process of exchange with the environment.

While concepts of life appear throughout Marx' work (life conditions, living labour etc.) he never worked out a definition of life as such, he was, however, aware of the crucial and mutual relationship between human life, labour and nature. Under the influence of the agrochemist Liebig, e.g. addressed the problem of "circulation of matter", i.e., metabolism (*Stoffwechsel*) between human society and nature in the *Capital* (1867 (1976)): "Capitalist production collects the population together in great centres, and causes the urban population to achieve an ever-growing preponderance. This has two results. On the one hand it concentrates the historical motive force of society; on the other hand, it disturbs the metabolic interaction between man and the earth, i.e. it prevents the return to the soil of its constituent elements consumed by man in the form of food and clothing; hence it hinders the operation of the eternal natural condition for the lasting fertility of the soil. . . ."

Several scientists, among them Nobel-prize winners like Schrödinger (1944), Luria (1973), and Nurse (2021) addressed the question of life by identifying some defining characteristics of living beings, drawing on deep insight into their fields, and being influenced by the zeitgeist. Since the second half of the last century, in the gene-centered era, cell metabolism, along with the study of regulatory interactions between populations and their resources, has fallen out of focus. However, in our century, the rapid accumulation of results from DNA-based molecular studies on gene regulation, epigenetics, and development offers an opportunity to gain new perspectives on life. For example, the emergence of metabolism as an essential characteristic of life became a researchable scientific problem (Kauffman, 2019). The new opportunities can be explored, especially when the dialectical nature of the multi-level, multi-scale organic processes is taken into account (Levins, 2006).

A Marxist concept of life is not merely of theoretical interest: it is politically urgent. Bio-political discussions — concerning the governance of populations, the administration of bodies, the commodification of biological processes, and the ecological crisis of capitalist accumulation — require a robust materialist theory of what life is. Without it, Marxism risks ceding the conceptual ground to frameworks that lack the resources to think the metabolic, systemic, and dialectical dimensions of living existence. A dialectical-materialist concept of life can provide the foundation that bio-political critique needs.

Dialectics and Life: Specific issues and their totality

The central idea of the tradition initiated by Levins and Lewontin in *The Dialectical Biologist* (1985) is that organic processes include environmental effects, and these processes actively influence and constitute their environments rather than being passively determined by them. The consequences of this central claim have been studied from the cellular level to the global one, often in sharp contrast to gene-centered interpretations.

In this view, the interactions between the genetic material and the "cell machinery" produce development; the gene and the environment are not independent causes. This insight is the central point of Susan Oyama (1985, 2000) "dialectical interactionism," according to Lewontin (2000). Thorough studies of these interactions led to the discovery of new mechanisms, such as complex gene regulatory networks, various modes of epigenetic inheritance, developmental bias, and genetic assimilation, which reemphasized that the development of individual organisms, as well as their evolution, results from these interactions (Gilbert and Epel, 2009).

Echoing the organism–environment dialectic, in contrast to viewing the mind as a computer, the 4E paradigm (embodied, enacted, embedded, extended cognition; (Newen et al., 2018) challenges the Cartesian isolation of the mind from the world and resonates with Marx’s account of labour as material, transformative praxis. Its integrated part, enactivism, has explicit overlaps with Marx’s concept of metabolism (*Stoffwechsel*) through its insistence that cognition is sense-making arising from the dynamic coupling of organism and environment. (Di Paolo, 2021).

As life activities of organisms require exchange of materials, their populations are also in exchange with their environment, which, in the face of their capacity for exponential growth, leads to negative feedback and population regulation either by resources or natural enemies (Pásztor et al., 2016). Thus, in the long run, organisms by actively shaping their lifeconditions construct their own niches by natural selection (Odling-Smee et al., 2003). All these achievements are summarized by the Extended Evolutionary Synthesis (EES), which posits two “defining themes”: constructive development and reciprocal causation (Laland et al., 2015). The first theme is that organismal development results from multiple steps of interaction between the genome and the organism’s internal environment, whereas reciprocal causation assumes feedback loops between the genome and its multi-level environment, leading to an evolutionary pathway influenced by the developmental process itself. Stepping forward to the eco-crisis and positioning the human society in relation to nature, Marx’s concept of *Stoffwechsel* itself designates not merely a biological metaphor but a structural relation between the social and the natural, between labour and the material conditions of life (Foster, 1999). Thus, metabolism – the exchange and transformation of materials – seems not only present but also in focus at each level of organisation. The mathematical and conceptual toolkit of the dynamical systems approach, together with a plethora of associated modelling tools, offers a powerful way to understand life as interactions among units governed by negative-feedback control within hierarchical systems. The scope of applications is wide: from intracellular processes and physiology to human-governed eco-socio systems in the Anthropocene (Folke et al., 2021). A challenge for a dialectical analysis is to provide an integrated view of the totality of life, grounded in scientific achievements and the identification of the driving forces that produce constant change – as Marx did.

Scope and Guiding Questions

We particularly encourage submissions from practicing life scientists who wish to reflect on the conceptual and methodological dimensions of their own research. Contributions engaging concrete empirical domains — such as evolutionary developmental biology, systems and synthetic biology, ecology, microbiome research, cognitive science, or multi-level modeling — are especially welcome. How do questions of organism–environment interaction, emergence, regulation, constraint, and multi-scalar causation arise within specific experimental systems or modeling frameworks? Where do existing biological practices implicitly converge with, revise, or resist dialectical approaches? By inviting work grounded in active research programs, this special issue seeks dialogue not only about biology, but with biology as it is currently practiced. We welcome contributions from philosophy, history, and the philosophy of science; biology and the life sciences; political theory; and critical theory. Contributions may engage with, but are not limited to, the following questions:

- What concept(s) of life can be found in Marx and Engels, and how do they relate to contemporary biology? How does Engels’ metabolic definition of life — in the *Dialectics of*

Nature and Anti-Dühring — connect to current systems biology and the extended evolutionary synthesis?

- What is the systematic role of Stoffwechsel in Marx? Does it constitute a theory of the living, or merely a figure of thought? How does it connect to accounts of metabolic rift and ecological crisis?
- How can the dynamical systems approach — with its negative-feedback units across scales from cell to ecosystem — be brought into dialogue with the Marxist dialectical tradition? What are the gains and limits of applying the same toolkit to social processes?
- How might concrete empirical research programs in evolutionary biology, ecology, systems biology, neuroscience, or microbiome science illuminate — or challenge — dialectical accounts of organism–environment interaction, emergence, and multi-level causation?
- In specific experimental systems or modeling practices, where do tensions arise between reductionist, gene-centred, or mechanistic explanations and more relational or systemic approaches — and how might these tensions be analysed in dialogue with Marxist or dialectical frameworks?
- What is the relation between the ‘strong’ dialectical claim (that life or nature is dialectical in itself) and the ‘weak’ methodological claim that living organisms must be understood dialectically, i.e. holistically and anti-reductionistically?
- How do DST, enactivism, and the 4E paradigm engage with, and potentially correct, the Marxist materialist tradition — and vice versa? What mutual corrections arise from these encounters?
- How does the concept of living labour in Marx connect to a broader theory of organic life, metabolic ecology, and the reproduction of life under capitalist accumulation?
- What does a Marxist concept of life contribute to bio-political discussions concerning the governance and commodification of bodies, populations, and ecological systems?

References

- Di Paolo, E. A. 2021. Enactive becoming. *Phenomenology and the Cognitive Sciences*, 20:783-809.
- Folke, C., S. Polasky, J. Rockström, V. Galaz, F. Westley, M. Lamont, M. Scheffer, H. Österblom, S. R. Carpenter, and F. S. Chapin. 2021. Our future in the Anthropocene biosphere. *Ambio*, 50:834-869.
- Foster, J. B. 1999. Marx’s theory of metabolic rift: Classical foundations for environmental sociology. *American Journal of Sociology*, 105:366-405.
- Gilbert, S. F., and D. Epel. 2009. *Ecological Developmental Biology: Integrating Epigenetics, Medicine, and Evolution*: Sinauer Associates.
- Kauffman, S. A. 2019. *A World Beyond Physics: The Emergence and Evolution of Life*: Oxford University Press.
- Laland, K. N., T. Uller, M. W. Fellman, K. Sterelny, G. B. Muller, A. Moczek, E. Jablonka, and J. Odling-Smee. 2015. The extended evolutionary synthesis: its structure, assumptions and predictions. *Proceedings of the Royal Society B-Biological Sciences*, 282.
- Levins, R. 2006. Strategies of abstraction. *Biology and Philosophy*, 21:741-755.
- Levins, R., and R. C. Lewontin. 1985. *The dialectical biologist*: Harvard University Press.
- Lewontin, R. C. 2000. Foreword. In S. Oyama (ed.), *The Ontogeny of Information: Developmental Systems and Evolution*, pp. VII. – XV.: Duke University Press.
- Luria, S. 1973. *Life: the unfinished experiment*: Scribner.
- Marx, K. 1867 (1976). *Capital*, vol. 1. New York: Vintage.
- Newen, A., S. Gallagher, and L. de Bruin. 2018. The Oxford Handbook of 4E Cognition. In A. Newen, L. De Bruin and S. Gallagher (eds.). Oxford University Press.
- Nurse, P. 2021. *What Is Life?: Five Great Ideas in Biology*: WW Norton.
- Odling-Smee, F. J., K. N. Laland, and M. W. Feldman. 2003. *Niche Construction: The Neglected Process in Evolution*: Princeton University Press.
- Oyama, S. 1985, 2000. *The Ontogeny of Information: Developmental Systems and Evolution*. 2nd ed: Duke University Press.
- Pásztor, L., Z. Botta-Dukát, G. Magyar, T. Czárán, and G. Meszéna. 2016. *Theory-Based Ecology: A Darwinian approach*. Oxford: Oxford University Press.
- Schrödinger, E. 1944. *What is life? The physical aspect of the living cell*: Cambridge University Press.

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