

Engels and the Second Foundation of Marxism

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On the opening page of *The Return of Nature*, I referred to the “second foundation” of socialist thought as follows:

For socialist theory as for liberal analysis—and for Western science and culture in general—the notion of the conquest of nature and of human exemption from natural laws has for centuries been a major trope, reflecting the systematic alienation of nature. Society and nature were often treated dualistically as two entirely distinct realms, justifying the expropriation of nature, and with it the exploitation of the larger human population. However, various left thinkers, many of them within the natural sciences, constituting a kind of second foundation of critical thought, and others in the arts rebelled against this narrow conception of human progress, and in the process generated a wider dialectic of ecology and a deeper materialism that questioned the environmental as well as social deprivations of capitalist society.¹



Engels takes charge of the building of barricades in Elberfeld, Germany, 1849. Drawing by V. Scheglov, 1961. Karl Marx and Frederick Engels Museum. Moscow.

The origins and development of this second foundation of critical thought in materialist philosophy and the natural sciences and how this affected the development of socialism and ecology constituted the central story told in *The Return of Nature*. The initial challenge confronting such an analysis was to explain how historical materialism, in the dominant twentieth-century conception in the West, had come to be understood as strictly confined to the social sciences and humanities, where it was divorced from any genuine materialist dialectic, since cut off from natural science and the natural-physical world as a whole.

¹ ↪ John Bellamy Foster, *The Return of Nature* (New York: Monthly Review Press, 2020), 7, emphasis added. Reference to the “second foundation of Marxist ecological thought” was first introduced twenty years earlier in *Marx’s Ecology*. See John Bellamy Foster, *Marx’s Ecology* (New York: Monthly Review Press, 2000), 250.

Explorations of the dialectics of nature by Frederick Engels along with Marxian contributions to natural science were commonly treated in the Western Marxist philosophical tradition as if they simply did not exist. The natural-physical world was seen within the dominant view of Marxism in the West as outside the domain of historical materialism. The realm of biophysical existence was thus ceded to a natural science that was viewed as inherently positivist in orientation. This was so much the case that, with the rise of the environmental movement in the 1960s, it never occurred to those on the left who wrongly charged that Marxism had contributed little or nothing to the development of ecological analysis, to look beyond the social sciences to socialist contributions in the natural sciences, out of which today's systems ecology arose. The irony was that not only had socialism engaged with the natural environment, but it had, in fact, from the very beginning played a pivotal role in the development of a critical ecology within science and materialist philosophy.

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Part of the problem was that the entire tradition of "dialectical materialism," associated with Soviet Marxism in particular, was declared by the Western Marxist philosophical tradition to be erected on false foundations. The dialectics of nature, as opposed to the dialectics of society, it was claimed, needed to be rejected since it lacked an identical subject-object and thus absolute reflexivity. But in rejecting the dialectics of nature, Western Marxism was compelled to absent itself from the natural world almost entirely, except insofar as it could be said to impinge on human psychology or human nature or to have an indirect impact via technology. This then encouraged a shift toward a more idealist interpretation of Marxism.²

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To be sure, the classical Marxism of Karl Marx and Engels in the mid-nineteenth century had its origin in the critique of social science. As Engels wrote, "classical political economy" was "the social science of the bourgeoisie" and, as such, the enemy of socialism.³ Marx's critique of classical political economy was aimed at uncovering the "hidden abode" of class-based exploitation and expropriation on which the capitalist mode of production was based.⁴ It was this critique, therefore, that constituted the initial foundation of Marxism. But from the first, the materialist conception of history in critical social science was inextricably tied to the materialist conception of nature in natural science. No coherent critique of political economy was possible without exploring the actual biophysical conditions of production associated with what Marx called the "universal metabolism of nature."⁵

² ↪ Western Marxism took its point of departure in this respect from the short footnote in Georg Lukács's *History and Class Consciousness*, where he indicated dissatisfaction with Engels's account of the dialectics of nature. Yet, as Lukács indicated on multiple occasions afterward, and as attested by the text of *History and Class Consciousness* itself, he did not actually reject the "merely objective dialectics of nature." The distortions of his thought in this respect nonetheless remain dominant. In the translation of his famous *Talism* manuscript, this went so far as to translate incorrectly what appears as "Dialectics in Nature" in the original German in one of the chapter headings as "Dialectics of" See Georg Lukács, *History and Class Consciousness* (London: Merlin, 1971), 24, 207; Georg Lukács, *A Defence of History and Class Consciousness: Talism and the Dialectic* (London: Verso, 2000), 94, 102–7; Kaan Kangal, "Engels' Intentions in *Dialectics of Nature*," *Science and Society* 83, no. 2 (2019): 218; Foster, *The Return of Nature*, 16–21.

³ ↪ Karl Marx and Frederick Engels, *Collected Works*, vol. 25 (New York: International Publishers, 1975), 463–64.

⁴ ↪ Karl Marx, *Capital*, vol. 1 (London: Penguin, 1976), 279.

⁵ ↪ Marx and Engels, *Collected Works*, vol. 30, 54–66.

Human beings themselves were seen by Marx as corporeal beings, and thus objective beings, with their objects outside of themselves. There was, then, in the end, only a “single science” looked at “from two sides,” those of natural history and human history.⁶ It was necessary, therefore, to go beyond philosophy and social science to engage in the critique of bourgeois natural science as well. Indeed, as a theoretical method, the philosophy of praxis could not be confined to the realm of social sciences and humanities, that is, it could not be divorced from natural science, without undermining its overall critique.

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The fact that natural science and social science, nature and society, are bound inextricably together in any attempt to confront the current mode of production and its consequences is dramatically demonstrated to us today by the current Anthropocene Epoch of geological history, in which capitalism is generating an “anthropogenic rift” in the biogeochemical cycles of the Earth System, endangering humanity along with innumerable other species.⁷ In these circumstances, the role of Marxian ecology in understanding our current environmental predicament is of crucial importance. It is here that the second foundation of Marxian theory within materialist philosophy and natural science proves to be indispensable to the development of a revolutionary praxis.

The Second Foundation

Marx and Engels did not see science, or what they called “scientific socialism,” in terms of the narrow conceptions of science that prevail in our day, but rather in the broader sense of Wissenschaft, which brought together all rational inquiries founded on reason.⁸ Reason as science had its highest manifestation in the application of dialectics, which

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Engels defined in the Dialectics of Nature as “the science of the general laws of all motion,” contending “that its laws must be valid just as much for motion in nature and human history as for the motion of thought.”⁹ Indeed, a consistent materialist dialectic was not possible on the basis of social science alone, since human production and human action occurred “in society, in the world and in nature.”¹⁰

Engagement with natural science became a more urgent necessity for Marx and Engels as their work proceeded. Charles Darwin’s evolutionary theory, in Marx’s words, was “the basis in natural science for our view.” Engels depicted Darwin as the leading “dialectical” thinker within natural history.¹¹ Revolutions in natural science, such as Justus von Liebig’s soil chemistry, allowed Marx to develop his theory of metabolic rift. The emergence of anthropology as a result of the revolution in ethnological time pulled Marx and Engels into this new realm having to do with prehistory.¹² They incorporated the new revolution in thermodynamics within physics into their political-economic critique.

⁶ ↪ Karl Marx, *Early Writings* (London: Penguin, 1974), 389–90; Marx and Engels, *Collected Works*, vol. 5, 28.

⁷ ↪ Clive Hamilton and Jacques Grinevald, “Was the Anthropocene Anticipated?,” *Anthropocene Review* 2, no. 1 (2015): 67.

⁸ ↪ Joseph Fracchia, *Bodies and Artefacts*, vol. 1 (Boston: Brill, 2022), 3.

⁹ ↪ Marx and Engels, *Collected Works*, vol. 25, 545.

¹⁰ ↪ Karl Marx, *Early Writings*, 398.

¹¹ ↪ Marx and Engels, *Collected Works*, vol. 24, 301; Marx and Engels, *Collected Works*, vol. 25, 633; Marx and Engels, *Collected Works*, vol. 41, 232, 246; Foster, *Marx’s Ecology*, 197, 291; Foster, *The Return of Nature*, 251–58.

¹² ↪ Foster, *Marx’s Ecology*, 212–21.

However, there were also negative developments that compelled the founders of historical materialism beginning in the 1860s to shift their research more in the direction of natural science, and the second foundation of Marxist theory. The defeat of the 1848 revolutions in Germany in particular had encouraged the growth of a mechanistic philosophy of science in a line extending from the later Ludwig Feuerbach to thinkers such as Ludwig Büchner, Carl Vogt, and Jacob Moleschott. At the same time, Friedrich Albert Lange had introduced neo-Kantianism as a dualist philosophical perspective aimed at circumscribing a one-sided mechanical materialism, which was then separated off from an equally one-sided social/ideal realm. Coupled with this was the spread in Germany of irrationalism in the philosophies of Arthur Schopenhauer and Eduard von Hartmann, who saw materialism and dialectics, principally G. W. F. Hegel and Marx, as the enemy.¹³ Eugen Dühring entered into all of this with an eclectic mix of neo-Kantian, pseudoscientific, and positivistic ideas that targeted Marx. Agnosticism in Britain, in the work of figures like Thomas Huxley and John Tyndall, was closely identified with neo-Kantianism. Social Darwinism first arose in this period principally as an attack on historical materialism in the work of the German zoologist Oscar Schmidt. As a result of these various attacks on materialism and dialectics, both Marx and Engels were pulled into the task of articulating a dialectics of nature consistent with a socialist conception of the metabolism of humanity and nature, in what was later variously referred to as dialectical materialism, dialectical naturalism, and “dialectical organicism.”¹⁴

Engels’s dialectical naturalism was first advanced in a comprehensive form in his influential work, Herr Eugen Dühring’s

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that “Nature is the proof of dialectics,” was clear from the start. Translated into today’s terms, it meant Ecology is the proof of dialectics.¹⁵

Revolution in Science (better known as Anti-Dühring), completed in 1878. His wider, unfinished work, written in the 1870s and ’80s, Dialectics of Nature, was not published in German and Russian until 1925, and had to await another decade and a half before it was to appear in English translation. Nevertheless, Engels’s central argument,

“Dialectics,” in its materialist form, was, in Engels’s words, “a method found of explaining...‘knowing’ by...‘being,’” rather than “‘being’ by...‘knowing.’” It “interprets things and concepts in their interdependence, in their interaction and the consequent changes, in their emergence, development, and demise.” Viewed in this way, “nature,” he wrote, “does not move in the eternal oneness of a perpetually recurring circle, but [goes] through a real evolution.” Thus, “the whole of nature accessible to us forms a system, an interconnected totality of bodies, and by bodies here we understand all material existences extending from stars to atoms.... It is precisely [their] mutual reaction that creates motion.”¹⁶ Nature as matter and motion (transformed energy) generates, within the course of natural history, new, emergent forms or integrated levels of material existence that arise out of, and yet remain dependent on the physical world as a whole. Human society is, in this sense, an emergent form of the universal metabolism of nature with its own specific laws.¹⁷

¹³ ↪ Marx and Engels, *Collected Works*, vol. 25, 340; Georg Lukács, *The Destruction of Reason* (London: Merlin Press, 1980), 403–8.

¹⁴ ↪ On “dialectical organicism” see Joseph Needham, *Moulds of Understanding* (London: George Allen and Unwin, 1976), 278.

¹⁵ ↪ Marx and Engels, *Collected Works*, vol. 24, 301; Marx and Engels, *Collected Works*, vol. 25, 23–27, 633; John Bellamy Foster, *The Return of Nature*, 254.

¹⁶ ↪ Marx and Engels, *Collected Works*, vol. 25, 26–27, 363, 593, 633.

¹⁷ ↪ On dialectics and integrated levels, see Joseph Needham, *Time: The Refreshing River* (London: George Allan and Unwin, 1943), 233–72; Jean-Pierre Vigier, “Dialectics and Natural Science,” in *Existentialism Versus Marxism*, ed. George Novack (New York: Dell, 1966), 243–57.

Engels has often been criticised on the left for his three dialectical “laws,” more properly referred to today as general ontological principles, that he presented in his works on the dialectics of nature: (1) the law of the transformation of quantity into quality, and vice versa; (2) the law of the identity or unity of opposites; and (3) the law of the negation of the negation. However, the first of these ontological principles has been long recognised within science through the concept of phase change, while the second is the main way in which dialectics is commonly approached in philosophy and social science through the concept of contradiction, or “the incompatible development of different elements within the same relation.”¹⁸ Most criticisms thus focus on the third of these laws, the negation of the negation, which is often simply dismissed.¹⁹

Nevertheless, it is important to understand these three laws or ontological principles in terms of a dialectics of emergence. For Engels, everything is motion, attraction and repulsion, contingency, and development, leading to new forms or levels of organisation in nature and human history. The law of the transformation of quantity into quality and vice versa refers to material transformation and transcendence at the most general level. Given such tendencies, arising out of the transformation of matter and motion (or energy) in organic and inorganic processes, contradictions or incompatible elements naturally ensue, leading to change as development, evolution, or emergence, the negation of the negation.

We can see the significance of this in Engels’s approach to geology. He treated geology and palaeontology as “the history of the development of the organic world as a whole,” which practically came into being as a developed field of scientific research only in the late eighteenth century. The world that geology describes exists even “in the absence of human beings.”²⁰ Nonetheless, geological history can be approached dialectically, since “the whole of geology is a set of negated negations” resulting in massive transformations on the surface of the planet that can be discerned by means of careful scientific investigation. Engels questioned Georges Cuvier’s crucial emphasis on geological “revolutions” or catastrophes as contaminated by religious dogma, and argued that Charles Lyell, with his gradualism, had introduced a more scientific approach to geology. But Lyell himself had made the error of “conceiving the forces at work on the earth as constant, both in quantity and quality,” so that “the cooling of the earth” associated with ice ages “does not exist for him.” In this view, there are no “negated negations” and no major, permanent changes.²¹

There was, for Engels, no constant, non-contingent, inconsequential process of earth surface formation in line with Lyell’s

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uniformitarianism. Massive transformations of the earth at certain intervals in its history, as emphasised by Cuvier, were not to be denied. Some of these criticisms (and appreciations) of both Cuvier and Lyell, advanced by Engels, were later developed in the twentieth century by the palaeontologist Stephen Jay Gould, who

¹⁸ ↪ Bertell Ollman, *Dance of the Dialectic* (Urbana: University of Illinois Press, 2003), 11; John Bellamy Foster, *Capitalism in the Anthropocene* (New York: Monthly Review Press, 2022), 304–8; Craig Dilworth, “Principles, Laws, Theories, and the Metaphysics of Science,” *Synthese* 101, no. 2 (1994): 223–47; Richard Levins and Richard Lewontin, *The Dialectical Biologist* (Cambridge, Massachusetts: Harvard University Press, 1985), 268.

¹⁹ ↪ A characteristic of much Marxist dialectical thought has been to downplay the negation of negation, or development, evolution, and emergence. This can be seen in Ollman’s influential work where “dialectical research” is confined to “four kinds of relations: identity/difference, interpenetration of opposites, quantity/quality, and contradiction.” Ollman, *Dance of the Dialectic*, 15. On Marx and “scientific socialism,” see Foster, *The Return of Nature*, 253. This was even more the case in Soviet Marxism. As Frederick Copleston notes: “In Stalin’s time, of course, the law of the negation of the negation was passed over in silence.” Frederick C. Copleston, *Philosophy in Russia* (Notre Dame, Indiana: University of Notre Dame Press, 1986), 327.

²⁰ ↪ Marx and Engels, *Collected Works*, vol. 25, 82, 326.

²¹ ↪ Marx and Engels, *Collected Works*, vol. 25, 126, 324–25.

used precisely these antinomies to explain the origins of the theory of punctuated equilibrium within the evolutionary process.²²

Anti-Dühring, because of its sheer range—addressing philosophy, natural science, and social science—became one of the most influential works of its time. It helped spark the development of left materialism in science, which was later given a further boost by the publication of *Dialectics of Nature*. This facilitated major ecological discoveries, especially in the Soviet Union in the first two decades after the revolution, and in the British Isles, where a tradition emerged drawing on both Darwin and Marx. Among the major figures in Britain were Marx’s friend, and Darwin and Huxley’s protégé, E. Ray Lankester, and later leading red scientists and related cultural figures such as J. D. Bernal, J. B. S. Haldane, Joseph Needham, Lancelot Hogben, Hyman Levy, Christopher Caudwell, V. Gordon Childe, Benjamin Farrington, George Thomson, and Jack Lindsay.²³ Along with Engels’s works on science, the red scientists drew heavily on V. I. Lenin’s *Materialism and Empirio-Criticism*.²⁴ Although frequently overlooked in treatments of Marxism, this tradition included the most prominent Marxist thinkers in Britain of the day, all of whom were connected with materialist philosophy and natural science. Their work sunk deep roots in natural science, the influence of which has extended to our own time.

Marxist scientists and materialist philosophers were the target of purges in the Soviet Union in the 1930s and in the anticommunist attacks in Britain and the United States in the 1950s. The suppression of red science, which seemed almost to disappear for a time, had deep ramifications for Marxism as a whole. Since the leading representatives of the Western Marxist philosophical tradition rejected outright materialism apart from economic/class relations—a position closely associated with their rejection of the dialectics of nature—they had almost nothing of substance to contribute to the ecological critique. This led to the myth that socialism as a whole had failed in this area.²⁵ To be sure, critical theorists such as Max Horkheimer and Theodor Adorno referred to the “domination of nature,” by which they chiefly meant the role played by instrumental rationality and technology in

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contemporary capitalist society, as well as the repressive effects of this on human nature. However, the material-ecological world itself was characteristically absent from their analysis. Hence, the dialectical connections associated with human social production and its metabolism with the larger environment were also absent.²⁶

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What has become clear with the growth of Marxian ecology since the 1980s is the close connection between the critique of economic alienation and ecological alienation under capitalism. Recognition that these constitute the two

²² ↪ Stephen Jay Gould, *The Structure of Evolutionary Theory* (Cambridge, Massachusetts: Harvard University Press, 2002), 479–92; Stephen Jay Gould, *Time’s Arrow, Time’s Cycle* (Cambridge, Massachusetts: Harvard University Press, 1987), 112–15, 133–34; Stephen Jay Gould, *Hen’s Teeth and Horse’s Toes* (New York: W. W. Norton, 1980), 97–105; Richard York and Brett Clark, *The Science and Humanism of Stephen Jay Gould* (New York: Monthly Review Press, 2011), 21, 28, 40–42.

²³ ↪ See Helena Sheehan, *Marxism and the Philosophy of Science* (Atlantic Highlands: Humanities Press, 1985); Foster, *The Return of Nature*, 358–530.

²⁴ ↪ I. Lenin, *Collected Works*, vol. 14 (Moscow: Progress Publishers, 1977).

²⁵ ↪ Sebastiano Timpanaro issued a strong criticism of Western Marxism for abandoning materialism, but since he also rejected the dialectics of nature, his analysis—despite its brilliance—was unable to overcome the limitations he imposed upon it. Sebastiano Timpanaro, *On Materialism* (London: Verso, 1975).

²⁶ ↪ The inability of critical theory, due to its shallow materialism and its denial of the dialectics of nature, to provide any meaningful ecological analysis is evident in a recent work seeking to promote classical critical theory’s contributions to ecology, chiefly that of Adorno, while at the same time acknowledging that “the classical Frankfurt School critical theorists hardly engaged with natural science,” or ecology. Carl Cassegård, *Toward a Critical Theory of Nature* (London: Bloomsbury, 2021), 11

sides of the historical-materialist critique has become increasingly pronounced in the context of the planetary ecological crisis. All of this calls for the reunification of Marxian theory, symbolised by the return of Engels, and an attempt to grapple with the universal metabolism of nature. There is an urgent necessity to transcend the current alienated form of the capitalist social metabolism with its destructive mediation of the human relation to nature through generalised commodity production.

Engels and the Roots of the Anthropocene

In the twenty-first century we live in an age of planetary ecological peril, represented by the anthropogenic rift in the Earth System. This is associated with the advent, around 1950, of the Anthropocene Epoch in the geological time scale, which succeeded the Holocene Epoch of the last 11,700 years. Capitalism is presently in the process of crossing planetary boundaries that have defined the earth as a safe place for humanity. If all geological history, as Engels said, is the history of “negated negations,” today the Holocene—the geological epoch in which human civilisation arose and prospered—is being negated by the system of capital accumulation, leading to the Anthropocene crisis of today.

If we were to look back to the earliest overarching recognition of the ecological predicament imposed by capitalist

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society, we could not do better than to turn to Engels’s famous treatment of this in “The Part Played by Labour in the Transition from Ape to Man” in the *Dialectics of Nature*. Here, Engels declared that human beings, as social beings, do not “rule over nature like a conqueror over a foreign people, like someone standing outside nature—but that we, with flesh, blood and brain, belong to nature, and exist in its midst, and that all our mastery of it consists in the fact that we have the advantage over

all other creatures of being able to learn its laws and apply them correctly.” Thus, for each presumed “victory” of humanity over the natural world of which we are a part, “nature takes its revenge on us,” leading to widespread natural/ecological devastations—not simply in the ancient and medieval worlds, but increasingly, and on a far larger scale, in the world wrought by capitalism and colonialism.²⁷

Failure to understand what Engels called “our oneness with nature” and the need to conform to its laws is itself a product

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of our historical class relations. Here the capitalist domination of nature becomes a means of dominating human beings. The result is that history moves in a spiral, exhibiting both progress and retrogression.²⁸ Marx and Engels, *Collected Works*, vol. 25, 313, emphasis added.

Accumulation of capital is accompanied by the accumulation of catastrophe. Moreover, under such an anarchic system—as opposed to a socialist and planned society controlled by the associated producers—a fully rational pursuit of science becomes impossible, and substantive irrationalism prevails even in the midst of the advance of formal technological rationality. Pointing to soil degradation, deforestation, floods,

²⁷ ↪ Marx and Engels, *Collected Works*, vol. 25, 460–62. Engels attributed ecological disasters to shortsighted, “unforeseen,” and “remote natural consequences,” and to the necessary byproducts of a system of production devoted only to immediate gain. In the chapter on “The Revenge of the External” in his *Barbaric Heart*, Curtis White explains that such “unintended consequences” are treated in capitalist economics as externalities, and it is these externalities, *vis-à-vis* natural processes, which are coming back to haunt capitalism. Marx and Engels, *Collected Works*, vol. 25, 461–62; Curtis White, *The Barbaric Heart* (London: Routledge, 2009), 89–107.

²⁸ ↪ Marx and Engels, *Collected Works*, vol. 25, 313, emphasis added.

desertification, species extinction, epidemics, and the squandering of natural resources, Marx and Engels indicated that the current mode of production was generating widening Earth catastrophes associated with the uncontrolled “interference with the traditional course of nature.”²⁹ Engels’s global analysis of nature’s “revenge” was thus at one with Marx’s theory of metabolic rift.

“The Part Played by Labour in the Transition from Ape to Man” was first published in 1896 in the German Social Democratic journal *Die Neue Zeit* shortly after Engels’s death. Although it is difficult to chart its influence outside of Marxism, it is remarkable how close Engels’s analysis was to the ideas put forward not long after by Lankester in 1905 in his Romanes Lecture at Oxford, “Nature and Man” (later retitled “Nature’s Insurgent Son”), and his related 1904 article “Nature’s Revenges: The Sleeping Sickness,” both of which were reprinted in his 1911 *The Kingdom of Man*.³⁰ We do not know if Lankester read Engels’s article, though he was fluent in German, communicated with social democratic circles, and would have been deeply interested in Engels’s analysis in this respect, which overlapped in many ways with his own.³¹ As a close friend of Marx and an acquaintance of Engels, a strong materialist, and a critic of capitalism (who had read Marx’s *Capital*), as well as the leading figure in British zoology at the time, Lankester’s radical ecological critique was necessarily related to historical materialism. In referring to the *Kingdom of Man*, Lankester sought to describe a new period in Earth history in which human beings were now the main force affecting the natural world, with the result that they increasingly must take responsibility for it. He presciently highlighted the ecological consequences of a capitalist economic system engaged in the unheeding destruction of nature, ultimately undermining humanity itself.

In “Nature’s Revenges,” Lankester referred to the human-social being as “the disturber of Nature,” including being the instigator through global capitalism and finance of all epidemics in animals and humans, which could be traced largely to social, and primarily commercial, causes, including the “mixing up of incompatibles from all parts of the globe.”³² Under these circumstances, humanity had no choice but to control its production and its relation to nature, relying on science and

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superseding the narrow dictates of capital accumulation, thus ushering in a coevolutionary development. Human society was on a permanent ecological knife-edge in its relation to the natural world, which Lankester described somewhat ironically as the “Kingdom of Man.” Such “effacement of nature by man” not only undermined living species, but also threatened civilisation and human existence itself.³³ The only answer was for social humanity to take responsibility for its relations to the natural world, in conformity with natural laws and principles of sustainability, in opposition to the capitalist mode.

Today, resistance to the notion of the Anthropocene Epoch is evident in many of those on the left, who, while largely oblivious of the scientific discussion, are horrified by the implications of a dominant *Anthropos*. This seems, in their minds, to point to an exaggerated humanism or anthropocentrism in the understanding of the physical world, and to a downplaying of the social causes of the geological climacteric that we are now witnessing. Yet, from a geological and

²⁹ ↪ Marx and Engels, *Collected Works*, vol. 25, 461.

³⁰ ↪ Ray Lankester, *The Kingdom of Man* (New York: Henry Holt and Co., 1911).

³¹ ↪ Lankester’s conception of human evolution in its emphasis on the hand was much closer to that of Engels in “The Part Played by Labour in the Transition from Ape to Man” than to either Darwin or Ernst Haeckel. See E. Ray Lankester, *Diversions of a Naturalist* (Freeport, New York: Books for Libraries Press, 1915), 243–44.

³² ↪ Lankester, *The Kingdom of Man*, 1–4, 26, 31–33, 184–89.

³³ ↪ Lankester, *Science from an Easy Chair* (New York: Henry Holt and Co., 1913), 365–79.

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Holocene Epoch in the Geologic Time Scale to the Anthropocene Epoch, where anthropogenic rather than non-anthropogenic factors are for the first time the major drivers of Earth System change, and in which human civilisation and human existence are currently imperilled.³⁴

From a historical and dialectical perspective, the planetary ecological contradictions that we are now witnessing have been long coming. The issue of a new “Kingdom of Man,” which was also at the same time subject to the revenge of nature or nature’s revenges, can be traced back to Engels and Lankester. Such views were related to the conception of

For the first time in the more than four billion years of Earth history, a living species, Homo sapiens, is the primary driver of Earth System change... industrial humanity is now permanently responsible, on pain of its own extinction, for limiting and controlling its effects on the Earth System.

Earth System perspective, the issues are clear. By crossing certain critical thresholds or planetary boundaries, the global system of capital accumulation has generated quantitative changes that represent a qualitative transformation in the Earth System, shifting it from the

nature as a dialectical totality mediated by processes of evolutionary change, in which humanity was increasingly playing a dominant role. It was in the Soviet Union during the 1920s that the notion of what was called the Anthropogene Period in geological history, connected to the disruption of the biosphere as defined by V. I.

Pavlov. The word Anthropocene itself, as an alternative to Anthropogene, first appeared in English in the early 1970s in the Great Soviet Encyclopedia.³⁵ It was by uniting the awareness of ecological destruction with the concept of ecosystem, the theory of the origins of life, and the analysis of the biosphere—all products of dialectical science—that Rachel Carson was able to warn the world population of the full scale of the planetary peril confronting them in her lecture introducing the concept of ecology to the general public. Moreover, it was socialist scientists who pointed to a decisive change in the human relation to the entire Earth System, or “ecosphere,” beginning around 1945.³⁶

Vernadsky, was introduced by the geologist Aleksei

More recently, we can point to the breakthrough in the treatment of the Anthropocene Epoch in Earth history represented by the geologist Carles Soriano. The conception of the Anthropocene Epoch in the Geologic Time Scale derives from the recognition that for the first time in the more than four billion years of Earth history, a living species, Homo sapiens, is the primary driver of Earth System change. This revelation of the human role in geological change was thus the product both of the emergence of Earth System science and the growing perception of an “anthropogenic rift,” undermining the earth as a safe home for humanity. It has its theoretical roots in the concept of metabolism, which formed the basis for both the notion of ecosystem (first introduced by Lankester’s student, the British ecologist Arthur Tansley, a Fabian-style socialist) and the later concept of the Earth System metabolism.³⁷

Once human society has emerged as the primary force in Earth System change due to the scale of production, inaugurating the Anthropocene Epoch, this becomes unalterable—barring the collapse of industrial civilisation in an

³⁴ ↪ Carles Soriano, “Anthropocene, Capitalocene, and Other ‘-Cenes,’” — The Jus Semper Global Alliance, March 2023.

³⁵ ↪ I. Vernadsky, *The Biosphere* (New York: Springer-Verlag, 1998); E. V. Shantser, “The Anthropogenic System (Period),” in *The Great Soviet Encyclopedia*, vol. 2 (New York: Macmillan, 1973): 139–44; V. I. Vernadsky, “Some Words About the Noösphere,” in *150 Years of Vernadsky*, vol. 2 (Washington, DC: 21st Century Science Associates, 2014), 82. The Anthropogene was initially introduced in the Soviet Union to describe the geological period now known as the Quaternary.

³⁶ ↪ Rachel Carson, *Lost Woods* (Boston: Beacon, 1998), 227–45; Barry Commoner, *The Closing Circle* (New York: Bantam, 1971), 60–61, 117, 138–45; Foster, *The Return of Nature*, 502–13; John Bellamy Foster and Brett Clark, “Rachel Carson’s Ecological Critique,” *Monthly Review* 59, no. 9 (February 2008): 1–17.

³⁷ ↪ A. O. Tansley, “The Use and Abuse of Vegetational Concepts and Terms,” *Ecology* 18, no. 3 (July 1935): 284–307. In developing the notion of ecosystem, Tansley relied heavily on the systems theory of the Marxist mathematician Hyman Levy. See Hyman Levy, *The Universe of Science* (London: Watts and Co., 1932).

Anthropocene extinction event. Like it or not, industrial humanity is now permanently responsible, on pain of its own extinction, for limiting and controlling its effects on the Earth System. Nevertheless, if capitalism by the mid-twentieth century has ushered in a planetary ecological rift, the possibility still remains of the transformation of the human metabolism with nature in conformity with natural laws in a society devoted to substantive equality and ecological sustainability.

Rooting his analysis in materialist dialectics, Soriano proposed in *Geologica Acta* in 2020 that the first geological age of the Anthropocene, following the current geological age of the Meghalayan (the last age of the Holocene Epoch), be designated as the Capitalian, in recognition of the destructive relation that capitalism is now playing with respect to the entire Earth System, creating a habitability crisis for humanity.³⁸ The Capitalian Age stands for the fact that behind the current Anthropocene crisis lies the capitalist mode of production. Environmental sociologists independently issued a similar proposal shortly after, suggesting that the new geological age associated with the advent of the Anthropocene Epoch should be called the Capitalinian, and that the future geological age toward which humanity must now necessarily strive—introducing a new climacteric surmounting the planetary emergency—should be named the Communian, after community, communal, and commons.³⁹ If all of geological history, according to Engels, is one of “negating negations,” leading to the Earth System crisis of today, we are now presented with the choice between the negation of the material conditions of human society itself to which capitalism is leading us, or else the negation of the capitalist mode of production (and thus of the present Capitalian/Capitalinian Age). What is essential in these circumstances is the creation of a new, socially mediated geological age of the Communian (the negation of the negation), embodying a restored, developed, and sustainable metabolism of humanity and the earth.

Dialectics, Engels argued, encompassed interaction, contradiction, and emergence, and was a general expression of the evolving totality of material things and of motion (matter and energy), applicable to all of existence. From this

The dialectics of nature offers new insights and methods for the understanding of our time, precisely because its approach is a unified one, bridging the great gulf that has emerged in the ecology of praxis.

standpoint, it was possible to understand more fully the material world around us, providing the basis of a grounded scientific socialism. In the past, Marxist scholarship with respect to Engels’s forays into dialectics of nature has focused simply on the question of the rejection or acceptance of his general views, leaving out the more positive challenge of exploring their significance for the

philosophy of praxis. Today, we need to go beyond this stale debate to recognise, in line with the neglected second foundation of Marxism within science and materialist philosophy, that the dialectics of nature offers new insights and methods for the understanding of our time, precisely because its approach is a unified one, bridging the great gulf that has emerged in the ecology of praxis.

As Soriano explains, “most natural sciences” today—if “spontaneously” and without full awareness—take “a dialectic and materialist epistemic view in understanding the natural side of the Earth System and of the Anthropocene crisis. From the social side of the problem, however, the epistemic view adopted by most natural scientists turns into an positivist and idealist one,” deferring to mainstream liberal social science and philosophy.⁴⁰ Meanwhile, the so-called Western Marxist tradition, while holding on to the notion of dialectics, has applied this only in ways related to the

³⁸ ↪ Carles Soriano, “On the Anthropocene Formalization and the Report of the Anthropocene Working Group,” *Geologica Acta* 18, no. 6 (2020): 1

³⁹ ↪ John Bellamy Foster and Brett Clark, “[The Capitalinian: The First Geological Age of the Anthropocene](#),” — The Jus Semper Global Alliance, October 2021.

⁴⁰ ↪ Carles Soriano, “Epistemological Limitations of Earth System Science to Confront the Anthropocene Crisis,” *Anthropocene Review* 9, no. 1 (2020): 112, 122, Soriano, “Anthropocene, Capitalocene, and Other ‘-Cenes,’” 14.

Today, the dialectics of nature must be reunited with the dialectics of society, the critique of political economy with the ecological critique of capitalism. This requires that the second foundation of Marxism be accorded a central place in the philosophy of praxis. The human relation to the earth lies in the balance.

identical subject-object of the human historical realm. The tendency here has been to portray natural science as primarily positivistic, while seeing no relation between nature and dialectics. In this way, the two realms of dialectical thought in the natural sciences and the social sciences have remained separate, making a unified praxis based on reason as science impossible. This can only be overcome by reunifying Marxism's first foundation in the critique of bourgeois political

economy with its second foundation in the critique of mechanistic science.

Writing in the tradition of Engels, Soriano states: "Nature is dialectical too, and the dialectics of Nature is not merely a theoretical construct but a construct that is only possible because Nature is inherently so. Otherwise, how is it possible to 'construct' dialectics if it is not yet in the studied object, which is the ultimate source of any empirical perception?"⁴¹ Today, the dialectics of nature must be reunited with the dialectics of society, the critique of political economy with the ecological critique of capitalism. This requires that the second foundation of Marxism be accorded a central place in the philosophy of praxis. The human relation to the earth lies in the balance.

Postscript: Did Engels Break with Marx on Metabolism?

Kohei Saito's important work *Marx in the Anthropocene: Toward the Idea of Degrowth Communism*, published by Cambridge University Press in 2023, has raised the critical question of whether Engels departed fundamentally from

Saito argues that Engels was largely responsible for the suppression of Marx's social metabolism/metabolic rift argument, helping "to make Marx's ecology invisible".

Marx's analysis of social metabolism.⁴² Saito charges that Engels, in editing the third volume of *Capital*, from the original draft in Marx's Economic Manuscript of 1864–1865, removed the adjective "natural" and thus in effect the term "natural metabolism" from Marx's passage on the "irreparable rift."⁴³ This is then backed up by a

criticism of Engels for allegedly "rejecting Liebig's concept of metabolism." On these bases, Saito argues that Engels was largely responsible for the suppression of Marx's social metabolism/metabolic rift argument, helping "to make Marx's ecology invisible," with disastrous effects for later Marxist theory. The reason given for Engels's alleged transgression in this respect is that his notion of the dialectics of nature represented an approach to nature/natural science that was in direct conflict with Marx's social-metabolic analysis. "It was precisely due to this difference" between Marx's and Engels's approaches to dialectics and ecology, we are told, "that the concept of metabolism and its ecological implication were marginalised throughout the 20th century."⁴⁴

It is true that the term "natural metabolism" was missing from the passage on the "irreparable rift" in Engels's edition of volume 3 of *Capital*. (This same term is also absent in Ben Fowkes's recent English-language translation of Marx's original manuscript for volume 3 in the Economic Manuscript of 1864–1865.) Hence, instead of capitalism leading to "an irreparable rift in the interdependent process of social metabolism, a metabolism prescribed by the natural laws of life

⁴¹ ↪ Soriano, "Epistemological Limitations of Earth System Science," 121.

⁴² ↪ Kohei Saito, *Marx in the Anthropocene: Towards the Idea of Degrowth Communism* (Cambridge: Cambridge University Press, 2023), 53–55.

⁴³ ↪ In Marx's original German, as well as in Engels's edition of the third volume of *Capital*, what is presented in the English translation as single sentence is in fact only a section of a much longer sentence, taking up an entire paragraph. Hence, rather than referring to a "sentence" in the discussion here, the term "passage" is used, particularly as the main issue in dispute concerns only a part of a sentence, even in the English-language edition.

⁴⁴ ↪ Saito, *Marx in the Anthropocene*, 45, 67–68.

itself,” as conveyed in Engels’s edition of third volume of *Capital*, the same passage should read, in Saito’s rendering: “an irreparable rift in the interdependent process between social metabolism and natural metabolism prescribed by the natural laws of the soil.” (An even more literal translation would be “an irreparable rift in the context of the social and natural metabolism prescribed by the natural laws of the soil.”) Engels, in editing the third volume of *Capital*, thus removed the term “natural metabolism,” though “natural” still remains in the rest of the sentence. In Saito’s view, this omission reflected a “profound methodological difference” between Marx and Engels on the concept of metabolism.⁴⁵

Yet, examined closely, it is debatable that the removal of “natural metabolism,” substantially changed the meaning of Marx’s original passage—certainly not enough to raise a significant issue in that regard. Although Marx referred in his

The notion of natural metabolism is basic to Marx’s entire materialist approach and is already assumed in the very concept of “social metabolism” itself, which mediates the relation of humanity with what Marx called the “universal metabolism of nature.”

original incomplete draft to the “social and natural metabolism,” definitely including the term “natural metabolism,” there was a certain redundancy here. The notion of natural metabolism is basic to Marx’s entire materialist approach and is already assumed in the very concept of “social metabolism” itself, which mediates the relation of humanity with what Marx called the “universal metabolism of nature.”⁴⁶ The social metabolism for

Marx is nothing but the specifically human relation (via the labor and production process) to the universal metabolism of nature. Moreover, even without the words “natural metabolism,” the passage indicates that the “irreparable rift in the interdependent process of social metabolism” violates “the natural laws of life [soil],” which itself refers to a break with the universal metabolism of nature. The omission of the word “natural,” and thus the term “natural metabolism,” does nothing to alter the fundamental point being made. Saito declares that what is lost in Engels’s version is Marx’s second-order mediation, or alienated mediation.⁴⁷ But that too is problematic, since the very context of the passage, as it appears in the third volume of *Capital*, is a rift in the social metabolism, that is, a disruption of the social-metabolic mediation of humanity and nature as a result of alienated capitalist production.

Saito supplements his philological argument on the missing term in Engels’s editing of Marx’s “irreparable rift” passage, with the additional charge that Engels developed a “critique of Liebig’s theory of metabolism.”⁴⁸ However, evidence of this “critique” is nowhere to be found in Engels’s writings. In fact, Saito himself is unable to offer a single sentence indicating such a critique of Liebig on metabolism issued from Engels’s pen. Instead, he resorts to highlighting Engels’s quite different criticisms in *Dialectics of Nature* of Liebig’s vitalism, including his rejection of Darwin’s theory of

⁴⁵ ↪ Karl Marx, *Marx-Engels Gesamtausgabe* (MEGA), II/4.2 (Berlin: Akademie Verlag, 1992), 753; Karl Marx and Friedrich Engels, *Werke*, Band 25 (Berlin: Dietz Verlag, 1964), 822; Saito, *Marx in the Anthropocene*, 53–55, 70; Karl Marx, *Capital*, vol. 3 (London: Penguin, 1981), 949; Karl Marx, *Economic Manuscript of 1864–1865* (Boston: Brill, 2016), 797–98. Saito also makes the point that Engels’s edition of volume 3 of *Capital* incorrectly uses the word “life” at the end of the disputed sentence, rather than “soil.” However, both terms essentially convey the same broad meaning in this particular context, while “soil” also appears in the sentence that follows in Engels’s edition of volume 3, as well as in Marx’s original manuscript. Saito himself said that this discrepancy was probably due to Marx’s poor handwriting, in which the words *Boden* and *Leben* look almost identical. Yet, although acknowledging in his footnote that this could very well have been a result of Marx’s poor handwriting, he nonetheless criticises Engels in his text for substituting the term “life,” claiming that Engels made this change to bring Marx’s sentence more in line with Engels’s own notion of the “revenge” of nature. Given the penmanship problem and the very problematic nature of Saito’s claims about the theoretical significance of the replacement of “soil” by “life,” this whole issue can be set aside in the present discussion. Saito, *Marx in the Anthropocene*, 56, 70.

In correspondence and discussions with me, Joe Fracchia has translated the critical passage in the original German in his *Economic Manuscript of 1864–1865* (as published in MEGA) slightly differently from Saito as: “provoking an irreparable rift in the context of the social and natural metabolism prescribed by the natural laws of the soil.” It is Fracchia’s translation that is the more literal one mentioned in the text. I owe much of my understanding of these philological problems to Fracchia, who helped me in exploring the differences and nuances in a close comparison of Marx’s original German text with his *Economic Manuscript of 1864–1865*, Engels’s edited German text of volume 3 of *Capital*, and the various English-language translations.

⁴⁶ ↪ Foster, *Capitalism in the Anthropocene*, 41–61; Marx and Engels, *Collected Works*, vol. 30, 54–66.

⁴⁷ ↪ *Marx in the Anthropocene*, 53. On István Mészáros’s concept of “second order mediation,” see John Bellamy Foster, “Foreword” in István Mészáros, *The Necessity of Social Control* (New York: Monthly Review Press, 2015), 16. On Marx’s concept of alienated mediation see Marx, *Early Writings*, 261.

⁴⁸ ↪ Saito, *Marx in the Anthropocene*, 45.

evolution and his hypothesis that life had existed eternally. Saito illogically infers from Engels's criticisms of Liebig in this regard that since Engels objected to Liebig's vitalistic and anti-evolutionary notions in biology, he must also therefore have objected to Liebig's use of the metabolism concept in his chemistry. However, Liebig was a "dilettante" in biology and at the same time a leading scientist in chemistry, a distinction that Engels stressed. What makes Saito's criticism here even more problematic is that Engels repeatedly utilised Liebig's analysis of the rift in the soil metabolism, in his own writings—even if he did not choose, as Marx did, to use the word *Stoffwechsel* (metabolism) in this context.⁴⁹

But the deeper theoretical problem confronting Saito, in his attempt to find evidence of Engels's supposed "rejection" of Liebig's concept of metabolism, is that Liebig, in utilising the notion of metabolism was referring to the natural-science concept of metabolism. Liebig did not, as in the case of Marx, develop the category of social metabolism. Saying that Engels rejected Liebig's concept in this regard then amounts to charging that he rejected the notion of natural metabolism, of which Engels, however, was a major nineteenth-century proponent. The concept of metabolism originated in German cell biology early in the nineteenth century and was applied broadly in Liebig's mid-century writings in agricultural chemistry.⁵⁰ Metabolism in this sense was a concept that Engels employed many times, including in his famous analysis of metabolism (and proteins) as the key to the origins of life.⁵¹ Indeed, the notion of *Stoffwechsel* was central to the development of the first law of thermodynamics in Julius Robert Mayer's "The Motions of Organisms and their Relation to Metabolism" (1845), which strongly influenced Engels (as well as Liebig and Marx).⁵²

All of this throws into further disarray the contention that Engels, supposedly encumbered by his dialectics of nature perspective, failed to appreciate the significance of Marx's inclusion of "natural metabolism" in the "irreparable rift" passage. It was due to this failing, Saito tells us, that Engels "intentionally" deleted the term natural metabolism, effectively "marginalising" and making "invisible" Marx's core ecological critique, which was thereby "suppressed."⁵³ Yet, here Saito is confronted with the inconvenient fact that Engels, who was certainly one of the most erudite figures of his day, wrote again and again on the subject of nature's metabolism, a concept for which he demonstrated a very deep appreciation.⁵⁴ Moreover, Engels's edition of the third volume of *Capital*, far from suppressing the conception of "natural metabolism," includes it in other places where Marx employed it in his original text.⁵⁵

Behind Saito's entire argument here is an attempt to reinforce the notion within Western Marxist philosophical tradition that Engels's dialectics of nature, with its wider materialism, was antithetical to Marx's own historical materialism. Thus, rather than looking at how Marx and Engels's ecological analyses are complementary and reinforce each other, we are presented with the notion of a theoretical break between the two that is rooted in Engels's dialectics of nature, which supposedly led Engels to distance himself from Marx's ecology. Yet, in the course of his argument, Saito is unable to find

⁴⁹ ↪ Saito, *Marx in the Anthropocene*, 56–57; Marx and Engels, *Collected Works*, vol. 25, 574–76; Justus von Liebig, *Familiar Letters on Chemistry, in Its Relations to Physiology, Dietetics, Agriculture, Commerce, and Political Economy*, fourth edition (London: Walton and Maberly, 1859), 283–86; John Farley, "The Spontaneous Generation Controversy (1859–1880)," *Journal of the History of Biology* 5, no. 2 (1972): 317; Frederick Engels, *The Housing Question* (Moscow: Progress Publishers, 1979), 92–93.

⁵⁰ ↪ Franklin C. Bing, "The History of the Word Metabolism," *Journal of the History of Medicine and Allied Sciences* 26, no. 2 (April 1971): 158–80.

⁵¹ ↪ Marx and Engels, *Collected Works*, vol. 25, 578; J. D. Bernal, *The Freedom of Necessity* (London: Routledge and Kegan Paul, 1949), 363–64; Foster, *The Return of Nature*, 414; Saito, *Marx in the Anthropocene*, 56–57.

⁵² ↪ Julius Robert Mayer, "The Motions of Organisms and Their Relation to Metabolism," in *Julius Robert Mayer: Prophet of Energy*, ed. Robert B. Lindsey (New York: Pergamon, 1973), 75–145; Kenneth Caneva, *Robert Mayer and the Conservation of Energy* (Princeton: Princeton University Press, 1993), 117; Marx and Engels, *Collected Works*, vol. 25, 688.

⁵³ ↪ Saito, *Marx in the Anthropocene*, 45, 53.

⁵⁴ ↪ Foster, *The Return of Nature*, 414.

⁵⁵ ↪ Marx, *Capital*, vol. 3, 195, 949, 954.

any satisfactory way of demonstrating that the dialectics of nature as developed by Engels is actually at odds with Marx's ecology. Hence, he merely contends that Engels's approach to Earth history was "transhistorical" in that it transcended human history in the manner of positivistic natural science when addressing nonhuman nature.⁵⁶ Yet, one wonders what

From the standpoint of the twenty-first century, is to be commended for conceiving of the reality of human-generated ecological crisis throughout the globe!

kind of natural science there would be if it were to restrict its analysis simply to human history, that is, if it were not transhistorical in the sense of superseding the human world. Clearly, our social being influences our understanding of nature, something that Engels emphasised as well as Marx. But science is necessarily concerned

with domains beyond the human.⁵⁷ Surely, an analysis of Earth history extending beyond human history did not contradict Marx's own thinking, since he exhibited a deep fascination with paleontological developments within geological time prior to human existence.⁵⁸

Engels is also criticised by Saito for developing a more "apocalyptic" theory of ecological crisis than Marx through his use of the metaphor of the "revenge" of nature and the notion that human beings are capable of undermining the conditions of their existence on a planetary scale.⁵⁹ Engels even contemplates human extinction in the distant future. Saito attributes such views to Engels's "apocalyptic" conception of the dialectics of nature as opposed to Marx's non-apocalyptic ecological conceptions in his theory of metabolic rift. But surely Engels, from the standpoint of the twenty-first century, is to be commended for conceiving of the reality of human-generated ecological crisis throughout the globe! Nor does this in any way contradict Marx's theory of metabolic rift, the contemporary relevance of which has mainly to do with the Earth System crisis.⁶⁰

The full extent of Saito's adherence to the notion of a break between Marx and Engels on the dialectics of nature, depicting a deep ecological split between the two thinkers, can be seen in his direct support for Terrell Carver's position that Engels most likely lied in his 1885 preface to *Anti-Dühring* when he indicated that he had read the various parts of that work to Marx prior to their publication in serial form. In Saito's own words, Engels's statement here was "not necessarily credible."⁶¹ Hence, Engels, it is insinuated, might very well have lied about his interactions with Marx in this respect. The fact that there is absolutely no basis for believing that Engels would have lied on such an important point, which does not at all fit with his character or his lifelong loyalty to Marx, does not seem to deter those sowing such doubts. Indeed, the nature of this argument is that Engels must have lied, because otherwise, Marx (who had contributed a chapter to *Anti-Dühring*) could be assumed to have been entirely familiar with that work prior to its publication and presumably agreed with its contents. This would then undermine the notion of a fundamental break between Marx and Engels.⁶²

⁵⁶ ↪ Saito, *Marx in the Anthropocene*, 59, 67.

⁵⁷ ↪ Saito points to Lukács's criticism in *History and Class Consciousness* of the validity of scientific experiment as a basis for a dialectical knowledge of the universal metabolism of nature and says that this constitutes the grounds for Lukács's rejection of Engels's dialectics of nature. Saito fails to note, however, that Lukács later reversed himself on this point in his 1967 preface to his book. Lukács, *History and Class Consciousness*, xix; Saito, *Marx in the Anthropocene*, 85.

⁵⁸ ↪ Marx and Engels, *Marx-Engels Gesamtausgabe* (MEGA) IV/26 (Berlin: Akademie Verlag, 2011), 214–19; Joseph Beete Jukes, *Student's Manual of Geology* (Edinburgh: Adam and Charles Black, 1872), 476–512; Foster, *Capitalism in the Anthropocene*, 51, 270; John Bellamy Foster and Brett Clark, *The Robbery of Nature* (New York: Monthly Review Press, 2020), 143; Saito, *Marx in the Anthropocene*, 65–67.

⁵⁹ ↪ Saito, *Marx in the Anthropocene*, 55, 59.

⁶⁰ ↪ On this see John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift* (New York: Monthly Review Press, 2010).

⁶¹ ↪ Saito, *Marx in the Anthropocene*, 51; Terrell Carver, *Marx and Engels: The Intellectual Relationship* (Brighton: Wheatsheaf, 1983), 123–25; Foster, *The Return of Nature*, 584. In addition to indicating that he had read the entire manuscript to Marx, Engels said that "it was self-understood between us that this exposition of mine should not be issued without his knowledge." Marx and Engels, *Collected Works*, vol. 25, 9.

⁶² ↪ Saito, *Marx in the Anthropocene*, 67.

Saito's attempt to establish a methodological break between Marx and Engels with respect to the concept of metabolism adopts a similar form for essentially the same reasons. Engels must be responsible for intentionally suppressing the term "natural metabolism" (and with it, the significance of the metabolic rift) in editing the third volume of *Capital*, since otherwise notions of the complementarity of Marx and Engels writings on ecology might carry the day, contradicting Saito's contention that "Marx never really adopted the project of materialist dialectics that Engels was pursuing."⁶³

Yet, the fact that Saito's whole supposed proof of a methodological break between Marx and Engels depends on the absence of a single term, the word "natural" preceding "metabolism," in a single passage, constituting a small change of

It was the development of ecosocialism a century after Marx's death that led to the rediscovery and reconstruction of Marx's theory of metabolic rift.

highly debatable significance, points to the total absence of any substantive evidence of such a break. To rend asunder Marx and Engels on metabolism and ecology on such a basis is unwarrantable. The truth is, while Engels did not directly employ Marx's notion of "social metabolism," except in his 1868 Synopsis of *Capital*, nor develop Marx's analysis in this regard, there is no indication that his outlook contradicted that of Marx in this area.⁶⁴

If Marx's theory of metabolic rift was not better known among Marxists prior to this century, this had nothing to do with Engels's alleged suppression of Marx's ideas, a claim for which there is no concrete basis. Rather, it had to do with the reality that the metabolism concept was embedded in the deep structure of Marx's work and thus was often overlooked, while a great deal of what he wrote on this was incomplete, and developed only in his later years. More importantly,

The object should be to unite the first and second foundations of Marxist thought, providing a broader material basis for the critique of the capitalist mode of production as the essential ground for a revolutionary ecosocialist praxis in the twenty-first century.

much of Marx's science, as Rosa Luxemburg emphasised, was well ahead of the socialist movement itself and would only be taken up as new problems presented themselves.⁶⁵ It was the development of ecosocialism a century after Marx's death that led to the rediscovery and reconstruction of Marx's theory of metabolic rift, rather than the reverse. This unearthing of Marx's ecological argument was partially enabled by the substantial (if somewhat indirect) influence that it had exerted, along with the work of Engels, on subsequent socialist ecological analyses within natural science and materialist philosophy.⁶⁶

Rather than perpetuating old divisions within the left, it is necessary today to bring Marx's social-metabolism argument together with Engels's dialectics of nature, seeing these analyses as integrally related. The object should be to unite the first and second foundations of Marxist thought, providing a broader material basis for the critique of the capitalist mode of production as the essential ground for a revolutionary ecosocialist praxis in the twenty-first century.

⁶³ ↪ Saito, *Marx in the Anthropocene*, 67.

⁶⁴ ↪ Frederick Engels, *On Capital* (New York: International Publishers, 1937), 63.

⁶⁵ ↪ Rosa Luxemburg, *Rosa Luxemburg Speaks* (New York: Pathfinder, 1970), 111. An additional factor was that the word *Stoffwechsel* was not originally translated as "metabolism" in the English-language translations of the first and third volumes of *Capital* in 1886 and 1909, but rather as "circulation of matter."

⁶⁶ ↪ See Foster, *Marx's Ecology*, 21–65; Foster, *The Return of Nature*, 405.

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❖ **About this paper:** This paper was originally published in English by Monthly Review in June 2023. This article is based on the Engels Memorial Lecture presented to the Marx Memorial Library in London, England, on November 30, 2022. It is revised here, including the addition of a lengthy postscript, from the earlier version published in the Marx Memorial Library's journal [Theory and Struggle](#) (May 2023), marx-memorial-library.org.uk/publications/theory-struggle.

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