



## Engels and the Dialectic of Nature

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Engels is usually looked upon as a follower and interpreter of Marx. But on this, the 200th anniversary of his birth, it is fitting to consider him as a philosopher in his own right, on a topic on which he took the lead in his partnership with Marx: his philosophy of nature.

Few philosophers have been more unjustly abused and defamed than Engels, and particularly for his ideas in this area. He is accused of being uneducated and ignorant, of knowing little of Hegel's ideas and understanding less, of peddling a crudely positivistic and mechanistic form of materialism and of putting forward the absurd and nonsensical idea that nature is dialectical.<sup>1</sup> It would be pointless and tedious to respond to these charges in detail, they are all completely false. Engels was a hugely wide ranging and knowledgeable thinker. He grew up at a time when German thought was dominated by Hegel's philosophy—he was steeped in it; and he continued to draw on Hegel's ideas throughout his life, as his continual references to Hegel in his philosophical works makes evident.

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The underlying ideas of Engels' philosophy are drawn from a deep understanding of Hegel's philosophy in an original and fruitful way, as I will go out of my way to illustrate in what follows. The non-reductive, dialectical form of materialism that he develops is entirely different from positivistic and mechanistic forms of it that he is accused of holding.

I shall focus particularly on the idea that nature is dialectical. This seems at first to be a very abstract and purely logical topic, but it has large and important implications, and it has given rise to controversies about fundamental philosophical issues over the years. It has been much criticized, and Engels has been a particular target for attack—but it is not clear why. The idea was not invented by Engels and it is not peculiar to him. The idea of a dialectic of nature is part of a larger philosophy of dialectic, the modern source of which is Hegel. According to this, everything concrete undergoes changes, and at the basis of these changes are contradictions that are inherent within them. For Hegel, these are meta-physical, logical truths that apply to all concrete things, whether in the realm of nature, society or thought. The idea that nature is dialectical is an intrinsic part of this philosophy, there is nothing special about it.

This philosophy was taken up and adapted by Marx and Engels. In the division of labour between them, the job of elaborating and explaining it fell to Engels. He did this at length in *Anti-Dühring*<sup>2</sup> and in *Ludwig Feuerbach and the End of Classical German Philosophy*.<sup>3</sup> His notes for a work he planned on the natural sciences were published posthumously under the title of *Dialectics of Nature*.<sup>4</sup> The idea that nature is dialectical is explained and defended in all these works as an integral part of the dialectical and materialist outlook as a whole.

Nevertheless, the idea that there are dialectical processes in nature has been singled out, and Engels has been castigated for holding it as though he is primarily responsible for it. This idea, it is said, commits the elementary logical error of attributing logical contradictions to mere things, whereas logical contradictions properly so-called can exist only in the realm of human thought and activity: between natural objects there can only be non-contradictory forms of opposition or conflict.

Engels quotes Eugen von Dühring as asserting that "Contradiction is a category which can only appertain to a combination of thoughts but not to reality. there are no contradictions in things".<sup>5</sup> Engels's claim that there are contradictions in nature, according to Dühring, commits an elementary logical fallacy by failing to make this simple logical distinction. This

argument has been repeated ever since. As Richard Norman, for example, puts it:

We need to distinguish between conflicts in the natural world and conflicts in human thought and activity. One and the same force cannot be in conflict with itself. The conflict is between one force and another, not a conflict within one force. But one and the same person can hold conflicting beliefs, and it is in such a case that we can talk of *self-contradiction*.<sup>6</sup>

Lucio Colletti spells out this point at length. A logical contradiction holds between a term and its negation, he asserts: it is expressed by the formula *A and not-A*. "Each opposite cannot stand without the other and vice-versa [...] In and for itself it is nothing; it is the negation of the other *and nothing else*".<sup>7</sup> In a contradiction, each opposite is not only opposed to, it is also united with the other. A contradiction is a unity of opposites: "Each pole of the contradiction is itself negative, being simply the *Negation* of the other, and its essence lies outside itself, in its opposite [...] it follows that if each pole is to be itself, it must imply the *relation* to the other, i.e. the *unity* of opposites".<sup>8</sup> A dialectical relation involves a contradiction of this form.

In nature, by contrast, there are only "real opposites" that have nothing in common with each other. Things in nature are entirely distinct and separate from each other. They are not united, they are merely different; they are external to each other. Conflicts between them are expressed by the formula *A and B*. In nature, in other words, "Each of the opposites is real and positive. Each subsists for itself [...] This is an *exclusive* opposition, instead of an *inclusive* opposition [...] Hence real extremes do not mediate each other".<sup>9</sup>

Similar views are expressed by many other writers. According to Jean-Paul Sartre, for example:

The mainspring of all dialectics is the idea of totality. In it, phenomena are never isolated appearances. When they occur together, it is always within the higher unity of a whole, and they are bound together by inner relationships, that is, the presence of one modifies the other in its inner nature.<sup>10</sup>

Like Colletti, Sartre thus maintains that a dialectical relation involves a contradiction and has the form of a unity of opposites. Such inner conflict,

and hence inner movement and life, exists only in the realm of human thought and activity. According to György Lukács:

The misunderstandings that arise from Engels' account of dialectics can in the main be put down to the fact that Engels—following Hegel's mistaken lead—extended the method to apply also to nature. However, the crucial determinants of dialectics—the interaction of subject and object, the unity of theory and practice, the historical changes in the reality underlying the categories as the root cause of changes in thought, etc.—are absent from our knowledge of nature.<sup>11</sup>

Similarly, Alfred Schmidt maintains that “negativity emerges only with the working subject”.<sup>12</sup>

In nature, by contrast, there are no contradictions. Natural objects are without their own movement and life—change comes to them only from without. According to Sartre, “Matter is characterized by its inertia. This means it is incapable of producing anything by itself. It is a vehicle of movements and of energy; and it always receives these movements and this energy from without”.<sup>13</sup> Thus “a material object is animated from without [...] is subject to forces which always come from elsewhere, is composed of elements that unite, though without interpenetrating, and that remain foreign to it. It is exterior to itself”.<sup>14</sup>

In short, according to these writers, dialectic occurs only in the realm of human thought and activity, there is no “dialectic of things”. And similar assertions could be quoted from many other authors who argue in similar terms.<sup>15</sup>

These views, it is claimed, are simply the expression of the elementary logical principle that there can be no contradictions in things, but it is clear that more than mere formal logical ideas are being put forward. Substantial philosophical views are being asserted—views about the character of the natural world, about the realm of human thought, and the differences between them.

As regards the natural world, what is being asserted is a purely mechanistic picture of it. According to this, natural entities are distinct and separate from each other, and only externally related. For, as Hegel says, the mechanistic view sees things as

complete and self-subsistent objects that, consequently, even in connection relate to one another as each standing on its own, each maintaining itself

in every combination as external.—This is what constitutes the character of mechanism, namely, that whatever the connection that obtains between the things combined, the connection remains one that is alien to them, that does not affect their nature [...] the connection remains nothing more than composition, mixture, aggregate, etc.<sup>16</sup>

Moreover, the mechanical view regards entities as inert and passive. They are solely positive. Negation and hence change can come to them only from outside. This principle is fundamental to the mechanical view. It is embodied in Isaac Newton's First Law of Motion ("an object either remains at rest or continues to move at a constant velocity, unless acted upon by a force"), and it is expressed in the classical empiricist view that a material object, in John Locke's words, is "inactive" and has "not the power to produce motion in itself".<sup>17</sup>

These are not mere formal logical claims; they are large metaphysical theses about the character of the material world—and questionable ones, as we shall shortly see.

The criticisms of the idea of the dialectic of nature that I have been describing also imply philosophical ideas about the realm of human thought and activity. This is portrayed as completely distinct and different from the natural world—as a realm of internality that is capable of sustaining internal contradictions, the realm of logic and thought, governed by rational principles.

Again, these are not merely formal logical views; they are major metaphysical theses. And they too are questionable. One of Engels's philosophical achievements is to criticize both these views and to develop a dialectical and materialist account of both nature and thought, and of the relation between them.

The mechanistic view of nature was created by scientists and philosophers in the seventeenth and eighteenth centuries. The development of mechanics and physics in this period constituted an enormous advance in the human understanding of the natural world. The great success of scientists in explaining the behaviour of physical phenomena suggested to many that it could be extended to understand all reality in purely material and mechanical terms. And so in this period these ideas were generalized by philosophers such as Thomas Hobbes, Pierre Gassendi, Julien Offray de La Mettrie and Baron D'Holbach into a metaphysical theory which claimed to be able to provide a complete account of all natural phenomena.

According to this philosophy, all reality is purely material or physical in character and can be understood and explained in mechanical and physical terms alone. Even the most complex natural phenomena can be accounted for in this way. All living things, including human beings, are merely complex material bodies acting in accordance with the laws of mechanics and physics. Human thought and feeling are nothing but the material activity of the brain and the nervous system. It can in principle be reduced to and explained by the laws of mechanics and physics.

Engels calls this philosophy “mechanistic materialism”. A descendent of these views, updated to take account of subsequent developments in physical sciences, currently goes under name of “physicalism”. It is still widespread and influential today.

Many philosophers, however, who accept the mechanistic account of purely material phenomena, argue that it cannot be extended to the realm of human thought and activity. Human beings are distinct from rest of natural creation, it is claimed; they are governed by different principles. A mechanistic, materialistic and reductionist theory is incapable of grasping the character of human subjectivity, rationality and freedom. This way of thinking leads to various forms of dualism. This outlook, too, has many contemporary adherents.<sup>18</sup>

The criticisms of the idea of the dialectic of nature put forward by Dühring, Colletti, Sartre, Norman and others presuppose a dualist position of this kind. They combine a mechanistic account of the natural world with the idea that the human realm is governed by different principles: dialectic applies only to realm of human thought and activity.

## BEYOND THE MECHANISTIC PHILOSOPHY OF NATURE

Engels rejects such dualism; he is a materialist. He rejects idea that human thought is something separate that transcends nature. But his materialism is not of the eighteenth-century mechanistic kind. He also questions the account of nature that is put forward by mechanistic materialists and physicalists and that is a part of the dualist position I have been describing. He puts forward a non-mechanistic, non-reductive, dialectical form of materialism.

Mechanics and physics were first developed in a rigorous fashion by natural scientists in the seventeenth and eighteenth centuries, and the mechanical conception of nature grew up in their wake. Subsequently, significant progress began to be made in the scientific understanding of

other and more complex aspects of nature, including chemical, geological, biological and social processes. In these areas different principles come into operation and require new and different modes of understanding. New branches of knowledge were created: chemistry, geology, biology, psychology and economic and social theory. Engels followed these developments with close attention, and they provide the basis upon which he develops a non-mechanistic, non-reductive dialectical form of materialism.

This does not deny the validity of mechanics or physics as branches of knowledge. All things are mechanical and physical; all things have a mechanical and physical aspect. This is described and explained by the sciences of mechanics and physics. These are and continue to be the most rigorous and fully developed areas of nature science.

However, the mechanical and physical aspect of natural phenomena is only one of their aspects. Concrete things are never solely mechanical or physical; they are always parts of other processes and have other aspects as well. The purely mechanical view of nature abstracts from these other aspects. It is blind to them and ignores them. Hegel has a clear understanding of this. As he says:

In Nature it is only the veriest abstract relations of matter in its inert masses which obey the law of mechanism. On the contrary the phenomena and operations of the province to which the term 'physical' in its narrower sense is applied, such as the phenomena of light, heat, magnetism, and electricity, cannot be explained by any mere mechanical processes, such as pressure, impact, displacement of parts, and the like.<sup>19</sup>

In chemical and biological phenomena, new, higher principles come into force. A living organism, for example, is made up of atoms and molecules that are governed by mechanical and physical laws; but an organism is not only a mechanical or physical system, and it has proved impossible to understand the structure and growth of living organisms in purely mechanical, physical or chemical terms, never mind the formation and evolution of living species, their distribution on the earth, etc.

Living organisms are governed by principles that cannot be reduced to purely physical or chemical terms alone. This is not just because biological organisms are too complex to be comprehended in current mechanical, physical or chemical terms. It is also and primarily because biological organisms have their own specific forms and properties:

Life is the mode of existence [...] 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 [...] Such metabolism can also occur in the case of inorganic bodies and in the long run it occurs everywhere, since chemical reactions take place, even if extremely slowly, everywhere. The difference, however, is that inorganic bodies are destroyed by this metabolism, while in organic bodies it is the necessary condition for their existence.<sup>20</sup>

A living organism has its own life and its own “interests”. Its activity and development can be understood only in terms of laws that govern the organism as a whole, principles that concern its life and its interests, its self-preservation and the preservation of its species. As Dennett says:

When an entity arrives on the scene capable of behaviour that staves off, however primitively, its own dissolution and decomposition, it brings into the world its “good.” That is to say, it creates a point of view from which the world’s events can be roughly partitioned into the favourable, the unfavourable and the neutral. As the creature thus comes to have interests, the world and its events begin creating reasons for it, whether or not the creature can fully recognise them. The first reasons pre-existed their own recognition.<sup>21</sup>

There is nothing mystical about this; it is not a matter of positing a mysterious form of “organic unity” or an immaterial “life force” or anything like that. Living organisms are natural, material things, made up of physical and chemical constituents and nothing more, and these obey the laws of physics and chemistry. But a biological organism is a higher and more complex form of organization of matter, governed also by higher and more complex—biological—principles, and mechanical and physical principles, although they continue to operate, and in Hegel’s words they “cease to be final and decisive and sink, as it were, to a subservient position”.<sup>22</sup>

Engels echoes this line of thought when he criticizes mechanical materialism for its, “exclusive application of the standards of mechanics to processes of a chemical and organic nature—in which processes the laws of mechanics are, indeed, also valid, but are pushed into the background by other, higher laws”.<sup>23</sup> These new, higher laws do not operate independently of physical laws, nor do they replace them. Rather they act in and through them, by giving a new and higher form of organization to



the physical and chemical phenomena. The biological level arises in and through the physical and chemical levels, not outside or apart from them.

In this way, chemical and biological forms and principles are not reducible to mechanical and physical ones, nor do they completely transcend them. The different levels are relatively autonomous, to borrow a useful concept from elsewhere in Engels' work.<sup>24</sup> They are distinct but also united; different, but also continuous with each other.

According to the non-reductive, non-mechanistic, dialectical, form of materialism that Engels puts forward, biological forms and laws do not supplant those of physics and chemistry. On the contrary, in a living thing the laws of the lower—physical and chemical—levels continue to operate. However, with the development of living organisms, new forms emerge and develop. New—biological—principles come into effect, and physical and chemical processes are subsumed within a higher form.<sup>25</sup>

Moreover, Engels argues, these different levels can change into each other. This is a further important insight of his dialectical form of materialism. The mechanical materialism of the eighteenth century did not comprehend such processes of development and change.

The other specific limitation of this materialism lay in its inability to comprehend the universe as a process, as matter undergoing uninterrupted historical development. This accorded with the state of the natural science of that time, and with the [...] anti-dialectical manner of philosophising connected with it.<sup>26</sup>

Of course, as Engels says, such materialism acknowledged that material entities are in motion. However, it was generally believed that natural processes move in repeated cycles. At this time, as Engels describes:

The Kantian theory of the origin of the Solar System [that the Sun and planets originated from incandescent rotating nebulous masses] had been put forward but recently and was still regarded merely as an oddity. The history of the development of the Earth, geology, was still totally unknown, and the conception that the animate natural beings of today are the result of a long sequence of evolution from the simple to the complex could not at that time scientifically be put forward at all.<sup>27</sup>

An unhistorical view of nature prevailed. Even for Hegel, despite the thoroughly historical way he sees the world of "spirit" (i.e. the human world), natural kinds are fixed and movement in nature takes the form

of unchanging cycles. Only gradually, from the end of the eighteenth century onwards, did it begin to be understood that nature must be conceived in a historical fashion as evolving and developing.

Higher natural forms emerge and develop out of lower ones, and can revert back to them. This occurs at all levels. Galaxies, stars and planetary systems emerge, develop and die. The surfaces of planets are undergoing a constant process of geological transformation. Biological organisms emerge out of inorganic matter. Living species emerge, evolve and become extinct.

Physical and chemical mechanisms are at the basis of all these developments; all of them involve physical and chemical processes. However, they cannot be comprehended in purely mechanical, physical or chemical terms. The historical and developmental processes involved are not recognized by the sciences of mechanics, physics or chemistry, nor are they visible to them. New and different geological, biological and evolutionary processes are in operation which are not reducible to the principles of mechanics, physics or chemistry alone. To comprehend such processes it is necessary to go beyond purely mechanical, physical or chemical ways of thinking and see the natural world as inherently changeable and evolving.

The dialectical account of nature recognizes this. It rejects the assumptions about nature that are implicit in the criticisms of it that I have been considering. It rejects the mechanistic picture which sees natural entities as inert and passive. Change and development do not come to them only from outside. As Hegel says:

To materialized conception existence stands in the character of something solely positive, and quietly abiding within its own limits: though we also know, it is true, that everything finite (such as existence) is subject to change. Such changeableness in existence is to the superficial eye a mere possibility, the realisation of which is not a consequence of its own nature. But the fact is, mutability lies in the notion of existence, and change is only the manifestation of what it implicitly is.<sup>28</sup>

And this implies that things are not purely positive. "The foundation of all determinateness is negation. The unreflecting observer supposes that determinate things are merely positive, and pins them down under the form of being. Mere being however is not the end of the matter: it is [...] utter emptiness and instability besides".<sup>29</sup>

Such views will no doubt provoke the objection that they presuppose Hegel's idealism and mysticism by attributing living features to purely inert and lifeless nature. According to Colletti, for example, Hegel's insistence that there are contradictions in nature amounts to the belief that, "The finite is limited, the perishable, the ephemeral. The finite 'seems' to be, and *is not*. The finite is that which is fated to come to an end: that which is evanescent and devoid of value".<sup>30</sup> According to Colletti this leads to the idealist conclusion that only the "Absolute" truly has being,<sup>31</sup> a Christian viewpoint that Colletti accuses Engels, Lenin and others of reproducing.

This charge is without foundation. Engels does indeed believe that the finite is contradictory, and he does inherit this view from Hegel, as Colletti says. It is also true that Hegel's account of nature ultimately takes an idealist form. However, Engels does not follow Hegel in believing that only the Absolute exists, nor need one do so. Engels uses some of Hegel's ideas to develop a materialist philosophy of nature. He holds that nature is indeed contradictory, that it has a history, that natural forms change and new forms emerge and grow. There is nothing idealist about these views.

Emergence, it should be added, is not an explanatory concept as I am using it here. It does not attempt to explain the development of higher natural forms from lower ones. It is not intended as an explanatory theory, as Andy Blunden appears to think.<sup>32</sup> It does not propose an explanatory mechanism like Charles Darwin's theory of genetic variation and natural selection. Rather, it describes the logical relation between different forms of organization of nature and of the different forms of explanation and branches of science needed to comprehend them.

## HUMAN THOUGHT AND ACTIVITY

These ideas and principles can also be extended to the realm of human thought and activity. From the materialist point of view, there is no reason to stop short of this. Human beings are biological organisms made up entirely of physical and chemical constituents. Human activity and thought are therefore physical, chemical, biological and natural phenomena.

Nevertheless, one cannot describe or understand human activity or thought in purely mechanical, physical, chemical or biological terms. They involve new and different forms and principles. Thought is, indeed, an

activity of the brain and nervous system, but it cannot be described or understood in the terms of physics, chemistry, biology or neuroscience alone. It is governed also by psychological, social and historical principles to which these other sciences are blind.

It is often argued that there is a fundamental difference between human and animal or other merely natural phenomena in that unlike purely natural entities, humans have the ability to act consciously, intentionally and freely, and they can act for reasons. As Immanuel Kant puts it, natural events occur *according* to laws and principles, but human beings also have the ability to act *from* principles.<sup>33</sup> These ideas imply that Marxism, as the study of human activity, must use methods which are completely different from those used in natural sciences to study mere things.

Engels is, of course, familiar with this line of argument. Although he insists that we should not underestimate the abilities of other animals, he agrees that there are fundamental differences between human, and other animals and forms of life. Drawing on his own abundant experience,<sup>34</sup> he writes:

In animals the capacity for conscious, planned action [...] attains a fairly high level. While fox-hunting in England one can daily observe how unerringly the fox makes use of its excellent knowledge of the locality in order to elude its pursuers, and how well it knows and turns to account all favourable features of the ground that cause the scent to be lost.<sup>35</sup>

Nevertheless, Engels argues, there still exist fundamental differences between human abilities and those of other animals: "All the planned action of all animals has never succeeded in impressing the stamp of their will upon the earth [...]. The animal merely uses its environment, and brings about changes in it simply by its presence; man by his changes makes it serve his ends, masters it".<sup>36</sup>

Even this difference may be less sharp than Engels here suggests. Beavers, for example, build dams in rivers "to serve their ends" and can change the environment considerably in the process. It might be argued that they are driven solely by natural impulses rather than exercising their "will", that they are acting according to principles rather than from principles; but these are not all-or-nothing matters, and we should beware of drawing too sharp a distinction here.

In any case, Engels agrees with the Kantian view that there are fundamental differences between humans and other animals in these respects. Humans have the capacity to act for reasons, not only from natural impulse. They can separate themselves from their situation and reflect upon it, and this separation enables them to reflect and to choose among alternatives, to exercise will and choice. It enables human beings to act autonomously and freely.

Many will be distressed by Engels's claim that humans "master" nature. He himself is aware of the problems that this language raises. Any idea that these uniquely human powers lift us above the natural world is illusory: "Let us not [...] flatter ourselves overmuch on account of our human victories over nature. For each such victory nature takes its revenge on us"<sup>37</sup> and brings with it unforeseen and sometimes disastrous consequences:

At every step we are reminded that we by no means rule over nature like a conqueror over a foreign people, like someone standing outside nature—but that we [...] 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. [...] But the more this progresses the more will men not only feel but also know their oneness with nature, and the more impossible will become the senseless and unnatural idea of a contrast between mind and matter, man and nature, soul and body.<sup>38</sup>

Moreover, Engels adds:

With man we enter *history*. Animals also have a history, that of their descent and gradual evolution to their present position. This history, however, is made for them, and in so far as they themselves take part in it, this occurs without their knowledge and desire. On the other hand, the more that human beings become removed from animals in the narrower sense of that word, the more they make their history themselves, consciously, the less becomes the influence of unforeseen effects and uncontrolled forces on this history.<sup>39</sup>

We are social beings, and our distinctively human abilities develop historically, in and through social relations: "It required the labour of thousands of years for us to learn a little of how to calculate the more remote natural

effects of our actions in the field of production, but it has been still more difficult in regard to the more remote social effects of these actions".<sup>40</sup>

Such knowledge is at the basis of our freedom. Again, Engels is following Hegel in seeing our freedom in these terms:

Hegel was the first to state correctly the relation between freedom and necessity. To him, freedom is the insight into necessity [*die Einsicht in die Notwendigkeit*]. 'Necessity is blind only in so far as it is not understood [*begriffen*].'<sup>41</sup> Freedom does not consist in any dreamt-of independence from natural laws, but in the knowledge of these laws, and in the possibility this gives of systematically making them work towards definite ends. This holds good in relation both to the laws of external nature and to those which govern the bodily and mental existence of men themselves—two classes of laws which we can separate from each other at most only in thought but not in reality.<sup>42</sup>

In short, our freedom and autonomy from natural forces are not transcendent powers that separate us absolutely from the natural world, as Kant implies. They are based upon and emerge out of naturally developed and socially acquired abilities and skills. They do not operate independently of natural processes, but in and through them, by giving them a higher form of organization. They are only relatively autonomous and different from the natural conditions and social practices on which they are based. They emerge and develop, gradually and by degrees, in the course of biological and historical evolution.

Engels thus rejects the dualistic separation of the world of human thought and activity from the rest of nature that is implicit in the criticisms of the idea of the dialectic of nature that I have been discussing. He does not privilege human abilities as transcendent, and separate and apart from nature. The idea that dialectic operates in nature as well as in the human realm is a logical expression of these views.

We are both material and social beings. All our activities are material, and they always occur in and through our social relations. In insisting that dialectic applies both to the natural and the social realms, Engels is affirming their unity and rejecting any attempt to drive a dualistic wedge between them.<sup>43</sup> As he and Marx wrote:

We know only a single science, the science of history. One can look at history from two sides and divide it into the history of nature and the history of men. The two sides are, however, inseparable; the history of

nature and the history of men are dependent on each other so long as men exist.<sup>44</sup>

Dialectical principles are at work in both the natural and the human realms: “The motion of matter is not merely crude mechanical motion, mere change of place, it is heat and light, electric and magnetic stress, chemical combination and dissociation, life and, finally, consciousness”.<sup>45</sup> Nature develops, it has a history, it is dialectical. It becomes organized—it organizes itself—in increasingly complex forms, until it develops consciousness of itself. Human capacities, including consciousness and rational thought, are natural capacities that have emerged through the development of natural processes. These are the ideas that are involved in Engels’ dialectical and materialist view of nature.

## NOTES

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3. Engels, *Ludwig Feuerbach and the End of Classical German Philosophy* (1886), in *MECW*, vol. 26.
4. Engels, *Dialectics of Nature* (1925), in *MECW*, vol. 25.
5. Engels, *Anti-Dühring*, p. 110.
6. Richard Norman and Sean Sayers, *Hegel, Marx and Dialectic: A Debate* (Brighton: Harvester Press, 1980), pp. 59–60.
7. Lucio Colletti, “Marxism and the Dialectic,” in *New Left Review* 93 (1975), p. 4.
8. *Ibid.*, p. 5.
9. *Ibid.*, p. 6.

10. Jean-Paul Sartre, "Materialism and Revolution," in *Literary and Philosophical Essays* (London, 1968), p. 191.
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13. Sartre, "Materialism and Revolution," p. 191.
14. *Ibid.*, p. 196.
15. Maurice Merleau-Ponty, "Marxism and Philosophy," in *Sense and Nonsense* (Evanston, 1964); Lichtheim, *Marxism. An Historical and Critical Study*; Kolakowski, *Main Currents in Marxism*, vol. 1, ch. XV; Norman in Norman and Sayers, *Hegel, Marx and Dialectic: A Debate*, chapters 2, 3, 5; Gareth Stedman Jones, *Karl Marx, Greatness and Illusion* (London, 2017); etc. There is a good brief review of this literature in Helena Sheehan, *Marxism and the Philosophy of Science: A Critical History: The First Hundred Years* (London, 2017), Chapter 1.
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18. Richard Warner and Tadeusz Szubka (eds.), *The Mind–Body Problem: A Guide to the Current Debate* (Oxford, 1994).
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20. Engels, *Dialectics of Nature*, p. 576 and note.
21. Daniel C. Dennett, *Consciousness Explained* (Harmondsworth, 1993), pp. 173–174.
22. Hegel, *Logic: Being Part One of the Encyclopaedia of the Philosophical Sciences (1830)*, §195 Addition.
23. Engels, *Ludwig Feuerbach and the End of Classical German Philosophy*, p. 370.
24. Engels, "To Conrad Schmidt, London, 27 October, 1890," in *MECW*, vol. 49. Engels uses this term to describe the relation of



- base and superstructure in Marx's social theory. See also Norman and Sayers, *Hegel, Marx and Dialectic: A Debate*, pp. 90–94.
25. The term “emergence” is not used explicitly by Engels as far as I am aware, but it has come to be used in connection with the sort of materialism he puts forward. It was introduced by philosophers and biologists, including G. H. Lewes and Samuel Alexander at the end of nineteenth and beginning of the twentieth century.
  26. Engels, *Ludwig Feuerbach and the End of Classical German Philosophy*, p. 370.
  27. *Ibid.*
  28. Hegel, *Logic: Being Part One of the Encyclopaedia of the Philosophical Sciences* (1830), §92 Addition.
  29. *Ibid.*, §91 Addition.
  30. Lucio Colletti, *Marxism and Hegel* (London, 1973), pp. 78.
  31. *Ibid.*, p. 25.
  32. Andy Blunden, “Marx, Hegel and Teleology,” [https://www.academia.edu/39280002/Marx\\_Hegel\\_andTeleology](https://www.academia.edu/39280002/Marx_Hegel_andTeleology) (2019).
  33. Immanuel Kant, *Groundwork of the Metaphysics of Morals*, trans. Mary Gregor (Cambridge, 1998), section I.
  34. He was a keen fox-hunter (Tristram Hunt, *The Frock-Coated Communist: The Life and Times of the Original Champagne Socialist* (London, 2010)).
  35. Engels, *Dialectics of Nature*, p. 460.
  36. *Ibid.*
  37. *Ibid.*, pp. 460–461.
  38. *Ibid.*, p. 461.
  39. *Ibid.*, pp. 330–331.
  40. *Ibid.*, pp. 461–462.
  41. Hegel, *Logic: Being Part One of the Encyclopaedia of the Philosophical Sciences* (1830), §147 Addition.
  42. Engels, *Anti-Dühring*, p. 105. See Christopher Caudwell, “Liberty,” in *Studies in a Dying Culture* (London, 1938). For an elaboration of this account of freedom.
  43. John Bellamy Foster, Brett Clark, and Richard York, *The Ecological Rift: Capitalism's War on the Earth* (New York, 2010), Chapter 11.
  44. Karl Marx and Frederick Engels, *The German Ideology* (1845), in *MECW*, vol. 5, p. 28 (passage crossed out in the original).
  45. Engels, *Dialectics of Nature*, p. 332.

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