

Friedrich Engels and the unveiling of the historical dimension of the physical world : science and dialectics

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Abstract

Marx and Engels showed that the history of the human world is not static, nor even cyclic, but is a forward movement, that can be explained and, to a certain extent, predicted (*Communist Manifesto*). This history cannot be understood without considering the necessity for the human animal to provide the means of existence for itself by work (production) in certain social relations. Marx untangled an unsolved problem of classical political economy, the origin of wealth under capitalism, by taking the difference (surplus value) between the work done by a worker and the work necessary to provide his or her means of existence. Engels may be associated with this breakthrough.

For the physical world, Newtonian mechanics proved extremely fruitful but its very success could induce a mechanistic, static view of the world. Engels is remarkable for having seen in some of the advances of science in his time the sign that the physical world too has a history. Already in the Newtonian heritage, there were hints in that direction, like the origin of celestial bodies or the slowing down of the Earth by the tides (Laplace, Kant...) Engels felt the importance of conservation and transformation of energy, of biological evolution (geology, Lamarck, Darwin...), of the unity of the biological world based on the cell. Observing the advances of organic chemistry he stressed the unity of the whole, together with its evolutionary character, from inanimate matter to life, to mind and to society.

The relation between dialectics and science has far reaching consequences for dialectics. Dialectics does not prove anything and one should not rely on dialectics to decide what is true or what is not true.

Hegel and History

In the case of History in the usual sense, history of mankind, Hegel (*Reason in History*) wanted to go further than “the events following on” “the destinies, passions, and energies of nations”.² He gave history a meaning, as an evolutionary process following “the moving Spirit”. Engels acknowledged this:

[...] the history of mankind no longer appeared as a wild whirl of senseless deeds of violence, [...], but as the process of evolution of man himself.³ (*Anti-Dühring*, Introduction, General.)

But for Hegel (*ibid.*) the motor of History “is the spirit of the events themselves, the moving spirit within them, for this is the true Mercury, the leader of nations.” Marx and Engels replaced that idealistic philosophy of History with a materialist science of History (that was later to be called historical materialism).

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2 www.d-meeus.be/marxisme/classiques/ADchap1.html#ADbousculade

3 www.d-meeus.be/marxisme/classiques/ADchap1.html#AD55un2

Hegel denies history to the physical world

With the progress of the bourgeoisie and the development of science came a materialist world view, mechanical, periodical at first. Celestial bodies turn round and round forever. Kepler's laws are only kinematic, about position and speed. Newton introduced a completely new point of view, dynamics, in which he derived movement from a force. This was already, to a certain extent an historical view of time. The huge difference between statics and dynamics was obvious for Newton⁴ and later scientists. But philosophers and the general educated public kept a rather mechanical materialist world view (if they were materialists at all).

Anyway, Engels conceded, an analytical approach was needed as a first step to collecting facts from which to build up a more synthetic outlook. More on this in Engels' *Anti-Dühring*, Introduction, General.

Hegel, the very philosopher who attempted to give History a meaning, denied history to nature. For him:

The changes that take place in Nature —how infinitely manifold soever they may be— exhibit only a perpetually self-repeating cycle ; in Nature there happens “ nothing new under the sun,” and the multiform play of its phenomena so far induces a feeling of *ennui* ; only in those changes which take place in the region of Spirit does anything new arise. (Hegel, *Philosophy of History* (rev. edition), The Colonial Press, New York, 1899, p. 54. Reprint : Dover, 1965, p. 104.)

Change and interaction

From Hegel, Engels inherited the view that the world was constantly changing. He hinted at it in a letter to Marx⁵, on May 30, 1873, announcing the dialectics of nature:

In bed this morning the following dialectical ideas on the natural sciences came into my head:

The subject of natural science — moving matter, bodies. Bodies cannot be separated from motion, their forms and kinds can only be known through motion, of bodies apart from motion, apart from any relation to other bodies, nothing can be asserted. Only in motion does a body reveal what it is. Natural science therefore knows bodies by considering them in their relation to one another, in motion. The knowledge of the different forms of motion is the knowledge of bodies. The investigation of these different forms of motion is therefore the chief subject of natural science.

The letter shows further that for him “these different forms of motion” involve change, transformations. In chapter 6 of the first part of the *Anti-Dühring*: “Motion is the mode of existence of matter”⁶ (here motion includes changes) and it comes back in some other places, as in *Dialectics of Nature*.⁷

As we have seen, for Hegel (because nature is not the realm of Spirit) motion and change in nature are meaningless, to the point of being “boring”. From his readings on natural science Engels on the contrary found plenty of interesting and meaningful things in nature.

Different manifestations of energy appear to be merely a unique energy under different forms. These

4 As Newton demonstrated, his mechanics entails Kepler laws but the converse is not true.

5 www.d-meeus.be/marxisme/classiques/Engelslettre1873-05-30Marx.html

6 www.d-meeus.be/marxisme/classiques/ADchap6.html. This idea can be traced back to Aristotle, *Metaphysics* (1015a): Ἐκ δὲ τῶν εἰρημένων ἡ πρώτη φύσις καὶ κυρίως λεγομένη ἐστὶν ἡ οὐσία ἢ τῶν ἐχόντων ἀρχὴν κινήσεως ἐν αὐτοῖς ἢ αὐτά. (From what has been said, then, the primary and proper sense of “nature” is the essence of those things which contain in themselves as such a source of motion.)

7 www.d-meeus.be/marxisme/classiques/dialnatIIformFondMouv.html

forms change into each other but the total energy is conserved⁸. Joule⁹ showed the quantitative relation between work and heat by experiment. Engels mentions this already in 1858 in a letter to Marx (July 14).¹⁰

In *Dialectics of Nature*,¹¹ Engels also stresses the importance of the discovery of the cell, building block of life.

Thus in physics and in biology, there appears to be a great unity of the world.

If all living beings are made of similar cells, it is not surprising that they are likely to be branches of one big family. In the meanwhile, chemistry was able to produce molecules that were supposedly peculiar to life (and therefore called “organic”). The path from organic chemistry (no longer foreign to ordinary chemistry) to the living cell, and from the cell to all living organisms opened the way to a fully materialistic account of life, where vitalism was no longer needed.

The historical character of the physical world

This brings us to the title of this talk. Hegel denied history to nature. But Engels made a better reading of natural sciences, and benefited from recent progress in science.

Kant began his career by resolving the stable solar system of Newton and its eternal duration, after the famous initial impulse had once been given, into the result of a historic process, the formation of the Sun and all the planets out of a rotating nebulous mass. (*Anti-Dühring*, Introduction, General.)¹²

In chapter 6 (part 1) he stresses the meaning of this:

The Kantian theory of the origin of all existing celestial bodies from rotating nebular masses was the greatest advance made by astronomy since Copernicus. For the first time the conception that nature had no history in time began to be shaken. Until then the celestial bodies were believed to have been always, from the very beginning, in the same states and always to have followed the same courses; and even though individual organisms on the various celestial bodies died out, nevertheless genera and species were held to be immutable. It is true that nature was obviously in constant motion, but this motion appeared as an incessant repetition of the same processes. Kant made the first breach in this conception, which corresponded exactly to the metaphysical mode of thought...¹³

In *Dialectics of Nature*,¹⁴ Engels also credits Kant (1724-1804) with the view that the rotation of the Earth is retarded by tidal friction.

Geology had shown that events in the history of the Earth had left different geological strata with

⁸ Engels seems to have overlooked the fact that quantitatively equivalent energies are not equivalently interesting and that all transformations are not always possible. He does not like the idea that the world should come to an end. In the Introduction to *Dialectics of Nature* look for the quotation “all that comes into being deserves to perish” from the *Faust* of Goethe and the pages that follow, to the end of the Introduction. It is not clear whether he does not understand the second law of thermodynamics, or rather whether he considers on philosophical grounds (“the indestructibility of motion”) that it cannot be true of the Universe as a whole.

The second law of thermodynamics can be expressed approximately as: (1) energy spontaneously disperses from being localised to becoming spread out if it is not hindered from doing so, (2) “quality” of energy degrades over time.

⁹ James Prescott Joule. Some had doubts about the possibility of measuring small fractions of a degree of temperature. They overlooked the fact that as a brewer, Joule had great experience of precise measures of crucial temperatures and densities.

¹⁰ www.d-meeus.be/marxisme/classiques/Engelslettre1858-07-14Marx.html. More in the *Anti-Dühring* and in *Dialectics of nature*.

¹¹ www.d-meeus.be/marxisme/classiques/dialnatIIintro.html and www.d-meeus.be/marxisme/classiques/dialnatIIIelemHistSci.html#fragFeuer

¹² www.d-meeus.be/marxisme/classiques/ADchap1.html

¹³ www.d-meeus.be/marxisme/classiques/ADchap6.html. Also in *Dialectics of Nature*, Introduction, www.d-meeus.be/marxisme/classiques/dialnatIIintro.html. Kant’s theory of the nebula was similar to the one of Thomas Wright (1711-1786) and was mathematically elaborated by Laplace. Objections have been made against it. Today, there is agreement on a modern revision of the theory of Laplace as Solar Nebular Disk Model (SNDM).

¹⁴ www.d-meeus.be/marxisme/classiques/dialnatIIffrottement.html.

fossils of known and unknown species. Lamarck proposed a first theory of evolution of species, by inheritance of acquired characteristics. The cell as basic “atomic” constituent of life opened the door to evolution. But the real breakthrough was made by Charles Darwin who gathered a lot of observations and proposed a convincing theory of evolution. *The Origin of Species* was published on 24 November 1859 and two weeks later Engels wrote to Marx:

[Manchester, 11 or 12 December 1859]

Dear Moor,

[...]

Darwin, by the way, whom I’m reading just now, is absolutely splendid. There was one aspect of teleology that had yet to be demolished, and that has now been done. Never before has so grandiose an attempt been made to demonstrate historical evolution in Nature, and certainly never to such good effect. [...]

Warm regards to your wife and children.

Your F. E.

Of all scientific discoveries and theories that Engels mentions as important, Darwin’s theory of evolution is certainly one of the most important, because it proposes a materialist explanation instead of a religious one. He comes back on this many times in the *Anti-Dühring*, in *Dialectics of Nature* and in his *Feuerbach*. This is also a most striking confirmation of the historical character of the physical world.

Dialectical materialism

I have chosen to show how Engels unveiled the historical character of the physical world. This is interesting, I hope, but not extremely original since he says so himself very explicitly more than once. I would like to conclude with a more personal consideration.

Against a mechanistic materialism, Marx and Engels developed a new materialism, that we may call dialectical, that

comprehends things and their representations, ideas, in their essential connection, concatenation, motion, origin, and ending¹⁵,

a materialism of motion, of change, of interconnection and history. Engels said a lot of different things about dialectics, but this is the most general definition of it.

Materialism, dialectics and science

For Marx and Engels, the basis of their materialism is science. Only science can tell us how the world is functioning (nature and society). In the afterword to the second German edition of *Capital*, Marx quotes a critic: the question is “to find the law of the phenomena with whose investigation he [Marx] is concerned” and “to show, by rigid scientific investigation, the necessity of successive determinate orders of social conditions, and to establish, as impartially as possible, the facts that serve him for fundamental starting-points”.¹⁶ In a letter to Mikhaïlovski, Marx says that one has to study different concrete historical processes and compare them, not apply some general philosophy of history.¹⁷

In the afterword, Marx goes on proposing to turn the dialectic “right side up again”, which means to rely on the Nature, known to us by science, instead of the Spirit.

In the quotation above (previous section), Engels goes on saying:

¹⁵ *Anti-Dühring*, Introduction, General, www.d-meeus.be/marxisme/classiques/ADchap1.html.

¹⁶ www.d-meeus.be/marxisme/classiques/postface2allemande.html.

¹⁷ www.d-meeus.be/marxisme/classiques/Otech-zapiski.html.

Nature is the proof of dialectics, and it must be said for modern science that it has furnished this proof with very rich materials increasing daily, and thus has shown that, in the last resort, nature works dialectically and not metaphysically.

It is not dialectics that decides what the world is, it is nature and science that tell dialectics what the world is.¹⁸ This is what is meant by turning dialectics “right side up again” (Marx, *Capital* I, “Afterword...” and a lot of different places in Marx and in Engels.) The consequences are far reaching.

One could be tempted to think that after being “turned right side up again” and “proven” by science, dialectics, now materialistic and no more idealistic, becomes something solid you could *rely* on for *knowledge*. Is it so? The answer is no. Dialectics gives you a deep and general idea of how the world is — that it is motion, change, interconnection and history. But dialectics *cannot decide* about anything, *cannot prove* anything. There are texts where Engels is very enthusiastic about dialectics, but he is very clear on its limits.

Dühring makes fun of Marx for proclaiming, he says, that a certain amount of money becomes capital only by virtue of some Hegelian miracle. Not so, says Engels:

Marx, on the basis of his previous examination of constant and variable capital and surplus-value, draws the conclusion that “not every sum of money, or of value, is at pleasure transformable into capital. To effect this transformation, in fact, a certain minimum of money or of exchange-value must be presupposed in the hands of the individual possessor of money or commodities.” (*Anti-Dühring*, part one, chapter 12.¹⁹)

This threshold effect on money, for it to become capital, is not true or untrue because of the dialectics, but is a result of a scientific enquiry on money, capital and surplus-value. That this shows a nicely Hegelian pattern of quantity turning into quality is an *a posteriori* remark. The same argument holds for the expropriation of the expropriators (*Anti-Dühring*, part one, chapter 13), which Marx bases on science only, on historical and economic considerations (*Capital* I, chap. 32²⁰). That this shows a nicely Hegelian pattern of negation of the negation is an *a posteriori* remark.

Maybe the best conclusion on this comes, again, from Engels himself, at the end of that chapter 13:

It is obvious that I do not say anything concerning the particular process of development of, for example, a grain of barley from germination to the death of the fruit-bearing plant, if I say it is a negation of the negation. For, as the integral calculus is also a negation of the negation, if I said anything of the sort I should only be making the nonsensical statement that the life-process of a barley plant was integral calculus or for that matter that it was socialism. [...] When I say that all these processes are a negation of the negation, I bring them all together under this one law of motion, and for this very reason I leave out of account the specific peculiarities of each individual process. Dialectics, however, is nothing more than the science of the general laws of motion and development of nature, human society and thought.²¹

If you want to *know* something (apart from general dialectical patterns) about barley or calculus, if you have to *decide* what is true or what is not true, you should rely *not* on dialectics, but on the specific science concerned. Here in the last sentence, Engels once more attempts to say what the dialectics is, but he says also that it is “*nothing more*” than this!

Not everybody has always clearly understood²² that limit of dialectics. In certain circumstances, some people allowed themselves to decide about scientific matters mainly on dogmatic dialectical considerations and it was certainly not with such happy effects.

18 For Lenin, “modern physics ... is giving birth to dialectical materialism.” www.d-meeus.be/marxisme/classiques/Len14MEchap5para8.html.

19 www.d-meeus.be/marxisme/classiques/ADchap12.html#seuilCapitalDuh.

20 Chapter 32 in the peculiar English numbering of chapters, inherited from an obsolete French edition, but maintained up to this day — in Marx’ *Kapital*, this is chap. 24, § 7. See www.d-meeus.be/marxisme/classiques/Capital-Itables.html.

21 www.d-meeus.be/marxisme/classiques/ADchap13.html#ADnegpartic.

22 To me it seems that Mao Zedong understood this particularly clearly as is shown by his insistence on “the particularity and relativity of contradiction” in his essay *On Contradiction*.