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MATERIALISM and EMPIRIO-CRITICISM

Critical Comments on a Reactionary Philosophy

(Chapter Five: The Recent Revolution in Natural Science and Philosophical Idealism)

4. The Two Trends in Modern Physics and English Spiritualism

In order to illustrate concretely the philosophical battle raging in present-day literature over the various conclusions drawn from the new physics, we shall let certain of the direct participants in the "fray" speak for themselves, and we shall begin with the English. The physicist Arthur W. Rücker defends one trend—from the standpoint of the natural scientist; the philosopher James Ward another trend—from the standpoint of epistemology.

At the meeting of the British Association held in Glasgow in 1901, A. W. Rücker, the president of the physics section, chose as the subject of his address the question of the value of physical theory and especially the doubts that have arisen as to the existence of atoms, and of the ether. The speaker referred to the physicists Poincaré and Poynting (an English man who shares the views of the symbolists, or Machians), who raised this problem, to the philosopher Ward, and to E. Haeckel's famous book and attempted to present his own views.[1]

"The question at issue," said Rücker, "is whether the hypotheses which are at the base of the scientihc theories now most generally accepted, are to be regarded as accurate descriptions of the constitution of the universe around us, or merely as convenient fictions." (In the terms used in our controversy with Bogdanov, Yushkevich and Co.: are they a copy of objective reality, of moving matter, or are they only a "methodology," a "pure symbol," mere "forms of organisation of experience"?) Rücker agrees that in practice there may prove to be no difference between the two theories; the direction of a river can be determined as well by one who examines only the blue streak on a map or diagram as by one who knows that this streak represents a real river. Theory, from the standpoint of a convenient fiction, will be an "aid to memory," a means of "producing order" in our observations in accordance with some artificial system, of "arranging our knowledge," reducing it to equations, etc. We can, for instance, confine ourselves to declaring heat to be a form of motion or energy, thus exchanging "a vivid conception of moving atoms for a colourless statement of heat energy, the real

nature of which we do not attempt define." While fully recognising the possibility of achieving great scientific successes by this method, Rücker "ventures to assert that the exposition of such a system of tactics cannot be regarded as the last word of science in the struggle for the truth." The questions still force themselves upon us: "Can we argue back from the phenomenon displayed by matter to the constitution of matter itself; whether we have any reason to believe that the sketch which science has already drawn is to some extent a copy, and not a mere dia gram of the truth?"

Analysing the problem of the structure of matter, Rücker takes air as an example, saying that it consists of gases and that science resolves "an elementary gas into a mixture of atoms and ether. . . . There are those who cry 'Halt'; molecules and atoms cannot be directly perceived; they are mere conceptions, which have their uses, but cannot be regarded as realities." Rücker meets this objection by referring to one of numberless instances in the development of science: the rings of Saturn appear to be a continuous mass when observed through a telescope. The mathematicians proved by calculation that this is impossible and spectral analysis corroborated the conclusion reached on the basis of the calculations. Another objection: properties are attributed to atoms and ether such as our senses do not disclose in ordinary matter. Rücker answers this also, referring to such examples as the diffusion of gases and liquids, etc. A number of facts, observations and experiments prove that matter consists of discrete particles or grains. Whether these particles, atoms, are distinct from the surrounding "original medium" or "basic medium" (ether), or whether they are parts of this medium in a particular state, is still an open question, and has no bearing on the theory of the existence of atoms. There is no ground for denying *a priori* the evidence of experiments showing that "quasi-material substances" exist which differ from ordinary matter (atoms and ether). Particular errors are here inevitable, but the aggregate of scientific data leaves no room for doubting the existence of atoms and molecules.

Rücker then refers to the new data on the structure of atoms, which consist of corpuscles (electrons) charged with negative electricity, and notes the similarities in the results of various experiments and calculations on the size of molecules: the "first approximation" gives a diameter of about 100 millimicrons (millionths of a millimetre). Omitting Rücker's particular remarks and his criticism of neo-vitalism,[3] we quote his conclusions:

"Those who belittle the ideas which have of late governed the advance of scientific theory, too often assume that there is no alternative between the opposing assertions that atoms and the ether are mere figments of the scientific imagination, and that, on the other hand, a mechanical theory of the atoms and the ether, which is now confessedly imperfect, would, if it could be perfected, give us a full and adequate representation of the underlying realities. For my part I believe that there is a *via media*." A man in a dark room may discern objects dimly, but if he does not stumble over the furniture and does not walk into a

looking-glass instead of through a door, it means that he sees some things correctly. There is no need, therefore, either to renounce the claim to penetrate below the surface of nature, or to claim that we have already fully unveiled the mystery of the world around us. “It may be granted that we have not yet framed a consistent image either of the nature of the atoms or of the ether in which they exist, but I have tried to show that in spite of the tentative nature of some of our theories, in spite of many outstanding difficulties, the atomic theory unifies so many facts, simplifies so much that is complicated, that we have a right to insist—at all events until an equally intelligible rival hypothesis is produced—that the main structure of our theory is true; that atoms are not merely aids to puzzled mathematicians, but physical realities.”

That is how Rücker ended his address. The reader will see that the speaker did not deal with epistemology, but as a matter of fact, doubtless in the name of a host of scientists, he was essentially expounding an instinctive materialist standpoint. The gist of his position is this: The theory of physics is a copy (becoming ever more exact) of objective reality. The world is matter in motion, our knowledge of which grows ever more profound. The inaccuracies of Rücker’s philosophy are due to an unnecessary defence of the “mechanical” (why not electromagnetic?) theory of ether motions and to a failure to understand the relation between relative and absolute truth. This physicist lacks *only* a knowledge of *dialectical* materialism (if we do not count, of course, those very important social considerations which induce English professors to call themselves “agnostics").

Let us now see how the spiritualist James Ward criticised I this philosophy: “Naturalism is not science, and the mechanical theory of Nature, the theory which serves as its foundation, is no science either. . . . Nevertheless, though Naturalism and the natural sciences, the Mechanical Theory of the Universe and mechanics as a science are logically distinct, yet the two are at first sight very similar and historically are very closely connected. Between the natural sciences and philosophies of the idealist (or spiritualist) type there is indeed no danger of confusion, for all such philosophies necessarily involve criticism of the epistemological assumptions which science unconsciously makes.”[2] True! The natural sciences *unconsciously* assume that their teachings reflect objective reality, and *only* such a philosophy is reconcilable with the natural sciences! “. . . Not so with Naturalism, which is as innocent of any theory of knowledge as science itself. In fact Naturalism, like Materialism, is only physics treated as metaphysics. . . . Naturalism is less dogmatic than Materialism, no doubt, owing to its agnostic reservation as to the nature of ultimate reality; but it insists emphatically on the priority of the material aspect of its Unknowable.”

The materialist treats physics as metaphysics! A familiar argument. By metaphysics is meant the recognition of an objective reality outside man. The spiritualists agree with the Kantians and Humeans in such reproaches against materialism. This is understandable; for without doing away with the *objective*

reality of things, bodies and objects known to everyone, it is impossible to clear the road for "real conceptions" in Rehmke's sense! . . .

"When the essentially philosophical question, how best to systematise experience as a whole [a plagiarism from Bogdanov, Mr. Ward!], arises, the naturalist . . . contends that we must begin from the physical side. Then only are the facts precise, determinate, and rigorously concatenated: every thought that ever stirred the human heart . . . can, it holds, be traced to a perfectly definite redistribution of matter and motion. . . . That propositions of such philosophic generality and scope are legitimate deductions from physical science, few, if any, of our modern physicists are bold enough directly to maintain. But many of them consider that their science itself is attacked by those who seek to lay bare the latent metaphysics, the physical realism, on which the Mechanical Theory of the Universe rests. . . . The criticism of this theory in the preceding lectures has been so regarded [by Rücker]. . . . In point of fact my criticism [of this "metaphysics," so detested by all the Machians too] rests throughout on the expositions of a school of physicists—if one might call them so—steadily increasing in number and influence, who reject entirely the almost medieval realism. . . . This realism has remained so long unquestioned, that to challenge it now seems to many to spell scientific anarchy. And yet it surely verges on extravagance to suppose that men like Kirchhoff or Poincaré—to mention only two out of many distinguished names—who do challenge it, are seeking 'to invalidate the methods of science.' . . . To distinguish them from the old school, whom we may fairly term physical realists, we might call the new school physical symbolists. The term is not very happy, but it may at least serve to emphasise the one difference between the two which now specially concerns us. The question at issue is very simple. Both schools start, of course, from the same perceptual experiences; both employ an abstract conceptual system, differing in detail but essentially the same; both resort to the same methods of verification. But the one believes that it is getting nearer to the ultimate reality and leaving mere appearances behind it; the other believes that it is only substituting a generalised descriptive scheme that is intellectually manageable, for the complexity of concrete facts. . . . In either view the value of physics as systematic knowledge *about* [Ward's italics] things is unaffected; its possibilities of future extension and of practical application are in either case the same. But the speculative difference between the two is immense, and in this respect the question which is right becomes important."

The question is put by this frank and consistent spiritualist with remarkable truth and clarity. Indeed, the difference between the two schools in modern physics is *only* philosophical, only epistemological. Indeed, the basic distinction is *only* that one recognises the "ultimate" (he should have said objective) reality reflected by our theory, while the other denies it, regarding theory as only a systematisation of experience, a system of empirio-symbols, and so on and so forth. The new physics, having found new aspects of matter and new forms of its motion, raised the old philosophical questions because of the collapse of the old physical concepts. And if the people belonging to "intermediate" philosophical

trends ("positivists," Humeans, Machians) are unable to put the question at issue distinctly, it remained for the outspoken idealist Ward to tear off all veils.

". . . Sir A. W. Rücker . . . devoted his Inaugural Address to a defence of physical realism against the symbolic inter pretations recently advocated by Professors Poincaré and Poynting and by myself" (pp. 305-06; and in other parts of his book Ward adds to this list the names of Duhem, Pearson and Mach; see Vol. II, pp. 161, 63, 57, 75, 83, etc.).

". . . He [Rücker] is constantly talking of 'mental pictures,' while constantly protesting that atoms and ether must be more than these. Such procedure practically amounts to saying: In this case I can form no other picture, and therefore the reality must be like it. . . . He [Rücker] is fair enough to allow the abstract possibility of a different mental picture. . . . Nay, he allows 'the tentative nature of some of our theories'; he admits 'many outstanding difficulties.' After all, then, he is only defending a working hypothesis, and one, moreover, that has lost greatly in prestige in the last half century. But if the atomic and other theories of the constitution of matter are but working hypotheses, and hypotheses strictly confined to physical phenomena, there is no justification for a theory which maintains that mechanism is fundamental everywhere and reduces the facts of life and mind to epiphenomena—makes them, that is to say, a degree more phenomenal, a degree less real than matter and motion. Such is the mechanical theory of the universe. Save as he seems unwittingly to countenance that, we have then no quarrel with Sir Arthur Rücker" (pp. 314-15).

It is, of course, utterly absurd to say that materialism ever maintained that consciousness is "less" real, or necessarily professed a "mechanical," and not an electromagnetic, or some other, immeasurably more complex, picture of the world of *moving matter*. But in a truly adroit manner, much more skilfully than our Machians *(i.e.,* muddled idealists), the outspoken and straightforward idealist Ward *seizes upon* the weak points in "instinctive" natural-historical materialism, as, for instance, its inability to explain the relation of relative and absolute truth. Ward turns somersaults and declares that since truth is relative, approximate, only "tentative," it cannot reflect reality! But, on the other hand, the question of atoms, etc., as "a working hypothesis" is very correctly put by the spiritualist. Modern, cultured fideism (which Ward directly deduces from his spiritualism) *does not think of demanding* anything more than the declaration that the concepts of natural science are "working hypotheses." We will, sirs, surrender science to you scientists provided you surrender epistemology, philosophy to us—such is the condition for the cohabitation of the theologians and professors in the "advanced" capitalist countries.

Among the other points on which Ward connects his epistemology with the "new" physics must be counted his deter mined attack on *matter*. What is matter and what is energy?—asks Ward, mocking at the plethora of hypotheses and their contradictoriness. Is it ether or ethers?—or, perhaps, some new "perfect

fluid," arbitrarily endowed with new and improbable qualities? And Ward's conclusion is: " . . . we find nothing definite except movement left. Heat is a mode of motion, elasticity is a mode of motion, light and magnetism are modes of motion. Nay, mass itself is, in the end, supposed to be but a mode of motion of a something that is neither solid, nor liquid nor gas, that is neither itself a body nor an aggregate of bodies, that is not phenomenal and must not be noumenal, a veritable apeiron [a term used by the Greek philosophers signifying: infinite, boundless] on which we can impose our own terms" (Vol. I, p. 140).

The spiritualist is true to himself when he divorces motion from matter. The movement of bodies is transformed in nature into a movement of something that is not a body with a constant mass, into a movement of an unknown charge of an unknown electricity in an unknown ether—this dialectics of *material* transformation, performed in the laboratory and in the factory, serves in the eyes of the idealist (as in the eyes of the public at large, and of the Machians) not as a confirmation of materialist dialectics, but as evidence against materialism: " . . . The mechanical theory, as a professed explanation of the world, receives its death-blow from the progress of mechanical physics itself" (p. 143). The world is matter in motion, we reply, and the laws of its motion are reflected by mechanics in the case of moderate velocities and by the electromagnetic theory in the case of great velocities. "Extended, solid, indestructible atoms have always been the stronghold of materialistic views of the universe. But, unhappily for such views, the hard, extended atom was not equal to the demands which increasing knowledge made upon it" (p. 144). The destructibility of the atom, its inexhaustibility, the mutability of all forms of matter and of its motion, have always been the stronghold of dialectical materialism. All boundaries in nature are conditional, relative, movable, and express the gradual approximation of our mind towards the knowledge of matter. But this does not in any way prove that nature, matter itself, is a symbol, a conventional sign, *i.e.,* the product of our mind. The electron is to the atom as a full stop in this book is to the size of a building 200 feet long, 100 feet broad, and 50 feet high (Lodge); it moves with a velocity as high as 270,000 kilometres per second; its mass is a function of its velocity; it makes 500 trillion revolutions in a second—all this is much more complicated than the old mechanics; but it is, nevertheless, movement of matter in space and time. Human reason has discovered many amazing things in nature and will discover still more, and will thereby increase its power over nature. But this does not mean that nature is the creation of our mind or of abstract mind, *i.e.,* of Ward's God, Bogdanov's "substitution," etc.

"Rigorously carried out as a theory of the real world, that ideal *[i.e.,* the ideal of "mechanism"] lands us in nihilism: all changes are motions, for motions are the only changes we can understand, and so what moves, to be understood, must itself be motion" (p. 166). "As I have tried to show, and as I believe, the very advance of physics is proving the most effectual cure for this ignorant faith in matter and motion as the inmost substance rather than the most abstract symbols of the sum of existence. . . . We can never get to God through a mere

mechanism" (p. 180).

Well, well, this is exactly in the spirit of the *Studies* "*in" the Philosophy of Marxism* ! Mr. Ward, you ought to address yourself to Lunacharsky, Yushkevich, Bazarov and Bogdanov. They are a little more "shamefaced" than you are, but they preach the same doctrine.

Notes

[1] The British Association at Glasgow, 1901. Presidential Address by Professor Arthur W. Rücker, in *The Scientific American. Supplement,* 1901, Nos. 1345 and 1346. —*Lenin*

[2] James Ward. *Naturalism and Agnosticism,* 1906, Vol. I, p. 303. —*Lenin*

[3] Nec-vitalism—an idealist trend in biology which arose at the end of the nineteenth century in opposition to the materialist world outlook and Darwinism. Its representatives (Wilhelm Roux, Hans Driesch, Jakob Uexkiill and others) revived the anti-scientific views of vitalism. They attempted to explain the phenomena of life and the purposiveness of living organisms by the action of special non-material factois ("life force", "entelechy", etc.), thus making living nature fundamentally different from non-living nature. The fallacious, anti-scientific character of neo-vitalism was exposed in the works of the materialist biologists (Ernst Haeckel, K. A. Timiryazev, I. P. Pavlov, etc.).

3. Is Motion Without Matter Conceivable? | 5. The Two Trends in Modern Physics, and German Idealism

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