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THE SCIENTIFIC MODERNITY OF HENRY ADAMS, AMERICAN MAN OF LETTERS

[ΛΕΥΚΗ ΣΕΛΙΔΑ]

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Henry Adams declared himself a child of the eighteenth century existing out of time in a world not his own. This declaration served admirably the literary and autobiographical purposes of *The Education*. In science, however, Adams was of his own time and in advance of his time. His response to the nineteenth century generalizations of evolution, the second law of thermodynamics and the rule of phase was truly modern in respect to his insight into scientific objectivity, generalization, prediction, complexity, social responsibility and especially in his constant effort to unite science with philosophy at a time when its divorcement was being emphasized. Adams refused to be concerned with the facts of science; only the principles, hypotheses, laws, and methods attracted him. Science gave a picture of nature, of the cosmos, and therefore of man and society, and consequently Adams declined to think of the theories of science without considering their significance for a philosophy of society or for metaphysics generally. Typical of Adam's procedure was his application to society of Driesch's definition of a biological organism in terms of entelechy. He wrote in his copy of Hans Driesch's *Science and Philosophy of the Organism*, "Does not this definition of organism apply more precisely to—the Church (Roman) An Army (to wit, German) A State (e.g. England) A Federation (United States) A Corporation (U.S. Steel)... The role of Entelechy in an army is sufficiently self-evident. It is not the sum of its units. It *is* its coordination to an end" (1). And in his copy of Lucien Poincaré's *La Physique Moderne* he noted, "Study this formula as applied to human society! S × Vol. = p" (2). In its metaphysical significance science

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1. Marginalia on p. 339 Hans Driesch, *The Science and Philosophy of the Organism*, London, 1908 (Gifford Lectures), vol. II, in Henry Adams's library, Massachusetts Historical Society.

2. Marginalia on p. 138 Lucien Poincaré, *La Physique Moderne*, Son Evolution, Paris (1906), in Henry Adams's Library, Massachusetts Historical Society.

seemed to solve for Adams the age-old philosophical problem of whether unity or multiplicity characterizes the world. The dualism of mind and matter or unity and multiplicity could be overcome by reducing both mind and matter to energy and thereby account for all events and objects in nature and in society. Belief in dualism seemed to Adams a confession of intellectual failure, and he welcomed therefore the monism that energetics suggested. Further, the definition of science as a unification of multiplicity, the description of science as being born of the discovery of identity and diversity, the equation of scientific explanation to generalization, and the definition of generalization as consisting solely of grasping the one in the many also reveal Adams's identification of science with philosophy (1).

Aside from Adams's modernity in recognizing the necessity for union between science and philosophy, we note his prescient cognizance of the specific characteristics of the modern scientific attitude. We are impressed by the firm grasp Adams has on scientific objectivity. In his article on Sir Charles Lyell's *Principles of Geology* he accepted as valid only those parts of Lyell's speculation that were supported by the facts of observation. He rejected Lyell's theory of astronomical influences on climatic variation because there were insufficient observational data to support it. He believed that the public, if not the scientist, could withhold final judgment on Darwinian evolution or the doctrine of special creation since both theories utilized embryonic development to support their contentions. Darwinism contended that embryonic recapitulation supported the theory of evolutionary development while the Special Creationists asserted that their conclusions were confirmed despite the resemblance of mammalian embryos to those of birds, lizards or snakes, because not one animal missed its proper development or grew to be anything other than what it was. The public could afford to wait, Adams wrote, until it was clear which theory could validly utilize the evidence of embryonic development. Adams was also perceptive in arguing that Darwin had announced a theory supported by the greatest ingenuity of reasoning and fertility of experiment, but in its nature incapable of proof. Julian Huxley more recently has also attested to the importance of the method and reasoning of Darwin and to the relative insignificance of the truth or falsity of his individual theory of evolution.

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1. Adams heavily underscored these definitions of science in his copy of J. B. Stallo's *La Matière et la Physique Moderne*, Paris, 1899.

But Adams was also aware of the significance of generalization in science. He was critical of Lyell for the lack of largeness in his theory, and was especially disappointed in the inability of American geologists to theorize about their findings. He believed that this inability to generalize was a cardinal defect of American thought. Indeed he asserted in *The Education* that Americans were deeply hostile to thought itself. "[Americans] naturally and intensely disliked to be told what to do and how to do it, by men who took their ideas and their methods from the abstract theories of history, philosophy, or theology." (1) While editor of the *North American Review,* Adams had asked Simon Newcomb to investigate "the causes of that indifference to abstract research." (2) We are forcibly reminded of Adams's assertions when such educators as Karl Compton state that the theoretical background of modern physics was developed by Europeans and that our schools of science have produced few theoretical scientists of distinction but many skilled technical and laboratory scientists. Adams himself made a great effort to redress this deficiency in theorizing in American thought by studying carefully the generalizations of science in order to make them the generalizations of society as well as of nature. His attempt, amateurish as it might seem to some scientists, nevertheless would, he believed, aid in making Americans more alert to the significance of scientific theories *per se* and as they related to society. This ability to handle generalizations enabled him to recognize a similarity between the concepts of Thomism and the concepts of modern science. In reading Saint Thomas, Adams emphasized nature, the sensory origin of concepts, and the Aristotelian scientific method rather than the theology with which the nineteenth century was usually concerned. He saw a scientific and materialistic quality in Saint Thomas in such a Thomistic analysis as is represented in the conclusion that the soul is individuated by matter. As Whitehead has pointed out, the medieval belief in the ultimate rationality of the world prepared the mind for the belief in the possibility of science. The clear distinction introduced by the Thomists between the

1. *The Edudation of Henry Adams,* New York, 1931, p. 239.

2. Newcomb in his centenary article described the neglect of abstraction and theory by American science and predicted dire consequences if such neglect were to continue, but he did not attempt to study the causes of that indifference. Letter to Simon Newcomb, 2 Aug., 1879: H. D. Cater, *Henry Adams and His Friends,* Boston, 1947, p. 69.

province of natural reason and that of faith made it possible for reason to assert its independent rights in its own sphere. Recognizing this divorce between physics and metaphysics in scholasticism, Adams discussed Saint Thomas in *Mont-Saint-Michel and Chartres* as a religious physicist and interpreted his philosophy in modern scientific terms.

Adams was perhaps most modern in his realization of the complexity of modern science and the bewildering consequences of that complexity. He declared that science had developed beyond the capacity of mind to control or even comprehend its latest developments. The Age of Multiplicity had been introduced by an enormous production of energy units that the human mind could not direct or control, and the only hope of the future was that the capacity of the human mind would be sufficiently enlarged to be able to comprehend and master these almost limitless energies. Adams was not optimistic about the prospect. Our own age has been engaged also in discussions as to whether man can control the tremendous energies liberated by atomic fission or indeed master in any socially responsible way any of the great developments in science before the destruction of man ensues as the result of this inability of mind to control science. And in physics itself the same problem exists. Bridgman says that in the direction of the very small, there is a world in which the very concepts of identity and of recurrence are not applicable. Since thought demands its permanent objects and its consiousness of recurrent situations, how can we think about a world that does not have these intellectual necessities? (1) Adams's vision in "Rule of Phase Applied to History" of the rule of phase extending to the point of thought dissolved in thought and therefore chaos is vividly confirmed.

Even the nature of the complexity of modern science was recognized by Adams as he became aware of the speculation that was to upset the absolute time and absolute space of Newton's universe. Science was abandoning the whole fabric of cause and effect. In a letter to C. M. Gaskell he declared, "Even time-sequence is beginning to be threatened. I should not at all wonder if some one should upset time. As for space, it is upset already" (2). J. B. Stallo in *Theories and*

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1. See P. W. Bridgman, "The Scientist's Commitment." *Bulletin of Atomic Scientists*, VI-VII, 196 (June-July, 1949).

2. Letter to C. M. Gaskell, 14 June, 1903: W. C. Ford, *The Letters of Henry Adams*, Boston and New York, 1930-38, vol. II, p. 409.

Concepts of Modern Physics had made Adams familiar with the state of speculation on relativity in that day. With considerable prescience he noted in the margin of his copy of Stallo's book, "Singular that the result of eliminating metaphysics should always be to become more metaphysical. Force becomes merely a mode of thought; mass is another; matter vanishes altogether; relation remains but only as a mathematical concept." And later he questioned, "Does this amount to saying that nothing is absolute and universal except relativity? Is it the creation of a new universal, or the assertion of multiplicity?" (1) Adams apparently believed in the permanence of the concept of relativity, but assimilated it to his own theory of multiplicity which encompassed the chaos and anarchy of his age.

Adams was not only aware of the complex world the primitive speculations about relativity had uncovered, but he also chafed bitterly at being unable to follow completely the theories of modern physics because they were necessarily couched in the inaccessible language of higher mathematics. He wrote, "The formulas of physics and chemistry are in a different mental horizon from those of our time. Even mathematics talk a different language." (2) The problem is still with us. The developments of physics and science generally have become increasingly difficult to communicate to the layman. The most significant concepts are evidently understandable without distortion only in their mathematical expression. Adams bemoanes his lack of understanding of higher mathematics; he believed that a certain ambiguity in his own thought may have been the result of the image-making of a non-mathematical mind. Precision in the exposition of thought and theory was attainable only in the clearly unambiguous symbolism of mathematics. Adams was enthusiastic over Keyser's *Mathematics* which demonstrated that a great many mathematical achievements were made possible by facts first noted by the physical eye, this in answer to Thomas Henry Huxley's objection that mathematicians knew nothing of observation, induction, experiment, and causation. Keyser was following Ernst Mach, who maintained that mathematical concepts no matter how tenuous or remote were literally

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1. Marginalia on p. 130 and on p. 160 of Adams's copy of Stallo's book in French translation, J. B. Stallo, *La Matière et la Physique Moderne*, tr. by C. Friedel, Troisième édition, Paris, 1899, in Henry Adams's library, Massachusetts Historical Society.

2. Letter to C. M. Gaskell, 23 October, 1908: Ford II, p. 511.

and continuously evolved in accordance with the needs of the animal organism and with environmental conditions, in contrast to Henri Poincaré who asserted that Modern Analysis was the free creation of the human spirit. Adams declared for Mach and against Poincaré, and therefore recognized what was for him the most meaningful approach in modern mathematics at a time when no one approach to mathematics had been established as superior.

Adams was also modern in "A Letter to American Teachers of History" and "Rule of Phase Applied to History" in his effort to translate all knowledge into the language of physics, for logical empiricists in contemporary philosophy believe that, apart from special techniques that may be required in explaining the structures of events and objects, a common method is applicable in every department of knowledge (1). Logical empiricists concluded that propositions in the *Geisteswissenschaften* are translatable into the universal language of physics (2). To these philosophers there is then only one science, departmentalized for reasons of convenience, and only one kind of general subject matter, as Adams so clearly believed in his last essays when he tried to interpret events and objects in terms of the thermodynamical laws of physics.

Adams conprehended the significance of the predictive possibilities of scientific theory. He was willing to test his dynamical or more accurately his thermodynamical theory of history by the predictions he had made. His description of the paradox of the inevitable momentum of the inert massive Russian nation astride the great Eurasian land mass establishing Russia as one of the two great colossi of the world along with the United States, at a time when England, France, and Germany were still great powers can be cited as an instance of accurate social prediction, although, of course, he was not alone among his contemporaries in making such a prediction. But Adams did not think of his dynamical theory of history as establishing an analogy between physics and history. Analogies can boomerang because analogical instances can always be established to prove the opposite of what was originally intended. Adams was more perceptive in thinking

1. See Henry Wasser, *Henry Adams, Lay Philosopher of Ssience*, doctoral dissertation in microfilm, Columbia University, 1951.

2. See Ernest Nagel, "Impressions and Appraisals of Analytic Philosophy in Europe," II, *Journal of Philosophy*, XXXIII, 40 (January, 1936).

of his theory as being a special case of the second law of thermodynamics which was universally valid.

Adams, then, was closest to the spirit of modern science in his realization that science was born out of philosophy and that to be fully meaningful and creative, science must come back to philosophy. His task, layman though he might be, was to relate science to philo-

aware engaged in attempting to reestablish that union. And Adams's a cient, ness and achievement are yet another indication of the pres ought modern complex mind of this man of letters whose response to th Ame- and art is becoming of increasing importance in understanding rican culture.