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Adams's Quest for the Unity of Knowledge

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Karl Shaddox, "Adams's Quest for the Unity of Knowledge"
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Abstract: In "Adams's Quest for the Unity of Knowledge," Karl Shaddox discusses Henry Adams's lesser known work, *The Degradation of the Democratic Dogma*, as a continuation of the historian's attempt at unifying knowledge in *The Education*. Whereas unification in *The Education* was proposed by historicizing force, whether religious or molecular, Adams's effort in *The Degradation* employed a scientistic approach to history. By expanding Gibb's research on the equilibrium of heterogeneous substances to account for social dynamics, Adams felt he had provided a universal explanation of material and intellectual change — and thus the elemental connection between matter and mind. Critical opinion has not been receptive to Adams's application of "The Rule of Phase," some asserting that *The Degradation* was not intended to be taken seriously. Adams was a subtle ironist, but given his historical instinct, it is difficult to conclude that this final work was an extended joke. Rather, the account of Adams's inability in *The Degradation* to accept limitations on human knowledge, should be read as an account of a paradigmatic shift in human perspective from plenary to partial knowledge of the world.

Karl Shaddox

Adams's Quest for the Unity of Knowledge

Nineteenth-century Europe witnessed a period of change unprecedented in human history. Mechanization, rising literacy, population growth, expansion of banking, implementation of monetary and economic reforms, shifting political alliances, and the growth of democratic and communal ideals at the expense of a centralized aristocracy, superseded a way of life that had been typical for most people since the middle ages. Many of these transformations, begun during the late Renaissance and hastened by the effects of the industrial age, brought improved living standards for more Europeans than ever before. Of course, not everyone was enthusiastic over improved conditions for the lower classes. Those who had something to lose, the nobility and landed classes in particular, did not, on the whole, welcome changes beneficial to commoners, and they actively worked to weaken or halt their impact. Others, however, were apprehensive for reasons which had little to do with entitlements and assets and more to do with what they perceived to be a threat to long held traditional views of humanity. For these humanist intellectuals, modernity engendered a deep, even apocalyptic sense of anxiety; there was the growing apprehension that "order had been sacrificed to formless and entropic anarchy" (Sheppard 326). The perfunctory regularity of the factory machines, the punctual, mindless routine of the workers who manned them, and the systematic grids of uniform compartments built to house them betrayed humanity in the spasms of chaos and fragmentation, if not imminent collapse.

The historian Henry Adams was well situated to bear witness to the effects of modernity on society in the U.S. A well traveled intellectual, a distinguished historian descended from US-America's first political dynasty, Adams's life spanned the most consequential years of nineteenth- and early twentieth-century modernism. Born 1838 in New England, he observed the northeast's transition from an agricultural to an industrial economy. His death in 1918, at the end of World War I, came almost a decade after Albert Einstein published his theories on relativity. Although by no means an aesthete, Adams held in common with modernists in Great Britain the belief that Western civilization was in a phase of regression. Before anything could be done to address this decline, however, the transformation had to be carefully understood; that is, it must be reconciled within the grand scheme of history. Adams's self-appointed task at the turn of the century was to discover, with the super-vision of the historian's diachronic gaze, the enduring principles and structures of the nature of human progress, obscured as they were by the flourishing social revolutions and cultural tumult going on all around him. In 1907 he published *The Education of Henry Adams*. The work has been called "one of the earliest expressions of modern nervousness" (Wieseltier xi). Certainly, there lingers, especially in its closing chapters a tone of apprehensiveness which resonates with the anxiety of the modernists. Security, progress, mission, hope, a clear sense of destiny — the by-words for industrial England and the United States in the previous century — do not appear in the final pages of *The Education*. The reader closes the book on a man who seems deeply dismayed and confused by modernity's competing tensions on human history. In the final chapter, "Nunc Age," Adams writes of the chaotic growth of New York City: "A traveller in the highways of history looked out of the club window on the turmoil of Fifth Avenue, and felt himself in Rome, under Diocletian, witnessing the anarchy, conscious of the compulsion, eager for the solution, but unable to conceive whence the next impulse was to come or how it was to act. The two-thousand-years failure of Christianity roared upward from Broadway, and no Constantine the Great was in sight" (500).

In writing *The Education,* Adams joined a long line of intellectual notables, beginning with Aristotle, Aquinas, and Kant in the modern age, who have attempted to perform a crucial service during a period of intellectual instability and social fragmentation. The task, as they saw it, was to bring form to an unsettled world by demonstrating how seemingly incommensurable discourses can be brought together into a logical vision, an epistemological whole. Adams believed that within the human was a will to unity, to historicity and to continuity. Yet mankind was at a crucial turning point in history. Modern advances and discoveries in geology, biological evolution, and in physics had strained to the breaking point the continuity of knowledge maintained since Galileo and Newton: multiplicity threatened to become the dominate paradigm, not unity. Causality, long an *a priori* fixture in the classical world, could no longer be assumed to be operative the same everywhere, every time.

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Adams had cause to worry, for the unity of knowledge was a basic tenet of liberal humanism. Because reason, understood as an innate human faculty, was thought to be independent of experience and so transcendent, knowledge, in theory at least, could be unified at some higher level. Like a picture puzzle, a unified representation of Nature was possible in the proper assemblage of its pieces. The introduction of probability into scientific theory, however, first in thermodynamics and then differently employed in quantum physics presented this project with a very formidable impasse. Probability forecloses explicitly on the possibility of total knowledge of molecular behavior or a given quantum event. It is not a question of incomplete information, that if all properties of an interaction are known, the outcome can be accurately deduced. Uncertainty is intrinsic to the system. The acceptance of this limitation, the recognition of disunity and so the incompleteness of human knowledge, was to mark a fundamental shift of epistemic proportion in the way humans regard themselves and their knowledge *vis-à-vis* the world. Humans, so probability theory suggested, were not the consummate masters of their world; there were limits to their epistemic sovereignty. Adams could not accept the constraints imposed by this new relationship with the world. His annoyance with many prominent scientists of the day who did illuminates a turning point in the history of human knowledge in the west. The polymath Adams believed that a logical and coherent, that is, full or theoretically full, understanding of the world was vital to man's essence as a free and self-determining creature: "For young men whose lives were cast in the generation between 1867-1900, Law should be Evolution from lower to higher, aggregation of the atom in the mass, concentration of multiplicity in unity, compulsion of anarchy in order; and he would force himself to follow wherever it led … He [Adams] took his education as a Darwinian in good faith. The Church was gone, and duty was dim but Will should take its place, founded deeply in interest and law" (*The Education* 218-19).

The generation of scientists on whom he vented his ire were experts in their fields, specialists whom Adams felt, did not possess the broad purview to put the elements together into a comprehensive whole. Adams was convinced that there was unity somewhere in the jumble, proliferation and fragmentation of knowledgeable disciplines. Science, the discipline that had played such a large role in the fragmentation of knowledge, would, by its own standards of rigorousness, be the means by which it was again unified. Adams was captivated by scientific knowledge and the technological developments of his era. Yet, like many modernist, this fascination was tempered by a concern with science and technology's sheer power to transform the lives of humans and the way they thought. Adams believed that knowledge itself was power, and if humans could harness the logical integrity of science for the purposes of unifying knowledge, humans could remain in control of their destiny. If they failed, they would regress to the level of humans in pre-modern times, enthrall to the forces and whims of nature.

The structure and formal procedures of science, with its concrete mode of inquiry, experimentation and data registration, was regarded as the means by which a discipline legitimized itself. By the end of the nineteenth century, psychology, sociology, and other new areas of discourse, ethnology, and economics, were all departmentalized in universities as authentic fields of study and pursued in standardized, quasi-scientific manners. History, too, among many of its practitioners, sought to professionalize itself through the legitimacy of fact. Historical fact was itself a new idea in modernism. As Hayden White points out in "The Fictions of Factual Representations," prior to the nineteenth century, history was looked upon more or less as literary art: "Specifically, [history] was regarded as a branch of rhetoric and its 'fictive' nature was generally recognized … on the whole, historiography [was not viewed] as a representation of the facts unalloyed by elements of fancy" (123). In post-revolutionary Europe of the nineteenth century, however, history began to purge itself of fabrication. Thus was born, White continues, "the dream of a historical discourse that would consist of nothing but factually accurate statements about a realism of events which were observable in principle" (123). The professional historian believed that "if one only eschewed ideology and remained true to the facts, history would produce a knowledge as certain as anything offered by the physical sciences and as objective as a mathematical exercise" (White 124). There was no lack of adherents to this credo, George Bancroft and William H. Prescott in the United States, and Leopold von Ranke in Germany. Initially an enthusiastic adherent to the historical fact and the potential for the unity of knowledge it promised, Adams had, by the end of the century, become frustrated with historicism and abandoned altogether the modern theories on which it was based. In chapters "The Abyss of

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Ignorance" and "Vis Inertiae," Adams recounts his discursive intellectual wanderings, his rereading Descartes, Hume, Berkeley, Kant, then Comte, Darwin, and Spencer, all to no avail. It is at this point in his life that he experiences a rapturous rebirth. At the Paris Exhibition before the quiet circular humming of a huge dynamo, Adams becomes transfixed and experiences there a sense of overwhelming inevitable force — moral, symbolic, and material. It was an experience which was everything a religious revelation should be: ecstatic, seminal, inarticulable. At the age of sixty-two, Adams had come to the Great Paris Exposition of 1900 with his friend, S.P. Langley. Reviewing in succession one industrial exhibit after another, they stopped at the great hall of dynamos. The respective reactions of Langley and Adams to the huge electric generators differed markedly. The engineer, so Adams relates in *The Education*, was mildly intrigued by dynamo's revolutionary engineering, yet another way to turn coal into energy. Adams, on the other hand, saw in the dynamo an "occult" power which transcended its mechanical materiality to become finally a "symbol of infinity" no less compelling than the Blessed Virgin Mary (*The Education* 353). Adams continues piecemeal through succeeding chapters of *The Education* to forge a comprehension of the dynamo as an avatar for the modern age. His presence there in the hall of the dynamos took on for him the aura of a religious pilgrimage. In the quiet, steady mechanical power of the generator, he recognized the promise of a "moral force" whose nature could not be understood by the rational systems of thought on which he, and the age in which he lived, had been nurtured. The force of the electron, electromagnetism, was something that, for the present, had to be accepted "in faith" (*The Education* 353). This leap over reason, the "parricide" Adams felt compelled to commit, was to disregard the heretofore unconditional belief in causality, the unquestioned foundation of Western thought. The electron inhabited a "supersensual" world that denied the observer not only the indefeasible immediacy of his senses, but because of its lack of dimensional extension, it defied classical conceptualizations of space and time altogether. Nothing with absolute certainty could be said about it other than that its force was always and everywhere omnipotent. Adams's inclination, he confesses, was to get on his knees and pray to the machine, welcoming it to the world as a new god.

Adams's prostration before the dynamo, his "historical neck broken" there in the exhibition hall in 1900 was understood by him as an important milestone in human history, an occasion not unlike that of Constantine, whose establishment of the Cross in 310 AD signified the advent of a new universal force. By historicizing the dynamo alongside Western religious icons, Adams recognized it as the new organizing principle for human history, for thinking and for an ethics to replace the increasing inconsequence of religion. Taking his cue from Michael Faraday, who discovered that electricity and magnetism, heretofore considered distinct forces, were really just aspects of the same essential energy, electromagnetism, Adams concluded that the common denominator subtending both the power of Blessed Virgin of the fifteenth century and the electromagnetic dynamo of the twentieth was "attractive force." For unity and direction a force from outside must function as the shaping influence for both mind and matter. By acknowledging the universality of that attractive force, the grip of relativism on the minds of intellectuals might be attenuated, and, perhaps, the basis for the unity of knowledge established. The sense of urgency to his purpose was deep. Scientists in the latter part of the nineteenth century had, so Adams believed, taken too modest and cautious a view of their work. They had lost their direction and with it their mandate as the definitive explicators of nature. Unlike earlier empirical realists, they did not look upon the work of science as a means to absolute knowledge about the world, but rather as an instrument for specific ends with no particular concern as to how things all fit together. Where and how was science supposed to converge with all other knowledge? Speaking at the same Paris exhibition which Adams attended, Henri Poincaré said that "Physicists were not decipherers of nature's laws, but librarians and cataloguers of experience. Theories and principles are not true or false, but more or less useful" (qtd. in MacLeod 10). In *The Education*, Adams makes clear his impatience with this attitude. Speaking of Karl Pearson, who wrote *The Grammar of Science*, Adams remarked that "Pearson shut out of science everything which the nineteenth century had brought into it. He told his scholars that they must put up with a fraction of the universe, and a very small fraction at that" (*The Education* 417).

For Adams, Pearson's and Poincaré's partial, instrumentalist view of scientific knowledge was inadmissible: "Every man with self respect enough to become effective, if only as a machine, has had to account to himself for himself somehow and to invent a formula of his own for his universe" (*The*

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Education 437). It was not that Adams was after a full and complete theory of everything, a perfect plenum, but if humans were to remain self-determining creatures, the charter of their own course in history, they must be guided by a correspondingly operative principle in the universe: "a spool on which to wind the thread of history without breaking it … a common factor" (437). Pearson and others' foreclosure on the unity of scientific knowledge could only promise dystopia, "a land … where order was an accidental relation obnoxious to nature; artificial compulsion imposed on motion; against which every free energy of the universe revolted; and which, being merely occasional, resolved itself back into anarchy at last" (424). Adams's response to what he perceived as a lack of intellectual fortitude on the part of scientific thinkers was his own preliminary attempt at unifying knowledge: "Assigning attractive forces to opposing bodies in proportion to the law of mass, takes for granted that the forces of nature capture man. The sum of forces attracts; the feeble atom or molecule called man is attracted; he suffers education or growth; he is the sum of the forces that attract him; his body and his thought are alike in their product; the movement of the forces controls the progress of his mind, since he can know nothing but the motions which impinge on his senses, whose sum make education" (439). Adams's "Dynamic theory of History" contained all the antithetical elements with which he had wrestled for years: attraction and opposition, mind and body, mass and energy, ignorance and intelligence, motion and stasis all melded into a universal principle. History and Science, then, like electricity and magnetism, were really just intellectual instantiations of the same ultimate force. In his study on Adams's scientific thought, Henry Wasser argues that Adams's conflation was something of a foregone conclusion given Adams's belief that "history was a science of vital energy which had been tending, along with every form of physical and mechanical energy, towards mathematical expression" (88). The attractive force for the scholastics, the Aristotelian pre-moderns, was (to be found in) God. Adams now saw that the absolute force was not other worldly, but here in this world; furthermore, that the "mechanism [of attraction] has always been the same" (*The Education* 451). Dynamism or Force is the single principle, the so called entelechy governing the fundamental constituents of matter; and since man is matter, he, too, would be subject to the same controlling forces. The primary difficulty with his theory was that while the force of physical action was commonly measured, the force of thought was not. Adams way out of this dilemma was to conceptualize the mind reductively: the mind was like a comet, a "complex of minute mechanical agencies, reacting within and without, and guided by the sum of forces attracting and deflecting it" (453). Because force subtends both the matter around us and the thoughts in our minds, "the true measure of both thought and matter is mass in its astronomical sense, the sum or difference of attractive forces" (453). At some point in the future, Wasser points out, Adams believed that "the motion of thought as continuous force could be measured mathematically, and a law of acceleration devised, by which history itself could be measured since the laws of history only repeated the lines of force or thought" (31).

As he himself admitted, Adams's scientific theory of history left much to be desired. The observation that a shift in human history of paradigmatic dimensions from unity to multiplicity had taken place was news only to anyone unfamiliar with the significance of Darwin's theory. The larger quandary was the speculative nature of his main thesis which contained little in the way of scientific fact. His attempts at bridging the divide between mind and matter through an underlying universal medium (force) lacked the rigorous inference and logic to warrant serious attention by other philosophers and scientists in the field. While the mind may be like a comet in art, in science there is no meaningful basis for comparison. Such seemingly tropic flourishes, even as they attempted to generalize and conceptualize an overarching idea, did more to confound the issue than clarify it. A more systematic and rigorous foundation was required.

The first decade of the new century was unique for Adams in that he published almost nothing. When he did it was clear he had little interest in the past and had become obsessed with the future. Adams saw the rising popularity of socialism and communism, the great social levelers, as a symptom of the end of the forward movement of Western thought. To Adams, it seemed that as the mechanisms of modernity spread, insinuating themselves into every facet of society, human life lost that which made it unique and extraordinary. More to the fact, the mechanization of human life, so he theorized, was indicative of a larger universal degradation that had been going on since the beginning of time; but because of the way the law of acceleration worked, that degeneration was only now happening rapidly enough to be evident to anyone with a trained eye, a historian. Although

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discouraged by a lack of progress and an embarrassing plethora of dead ends in his writings after the publication of *The Education*, Adams had not given up his dream of a totalizing scientific theory of history. If anything, he grew more determined that such a feat could be accomplished. In the early years of the new century, Adams composed a number of essays, collected posthumously by his brother Brooks, entitled *The Degradation of the Democratic Dogma*. The book is by any standard a supremely ambitious work. The compilation, which draws heavily on scientific scholarship of the mid to late nineteenth century and the Second Law of Thermodynamics, attempts to formulate quantitatively a time-line for the sequential passage of history: "Only by watching its motion on the enormous scale of historical and geological or biological time can one see — across great gulfs of ignorance — that the current [of Thought] has been constant as measured by its force and volume in the absorption of nature's resources, and that, within the last century, its acceleration has been far more rapid than before" (*The Degradation* 304). Drawing from an extraordinarily wide range of disciplines and disturbing global events, Adams gathered evidence which, taken in the aggregate, signaled what he believed to be the imminence of human dissipation and decline. In the final essay of the collection, "The Rule of the Phase applied to History," Adams uses the Second Law of Thermodynamics to explain the past and determine the future. The prognosis for humanity is not a cheerful one:

> The law of thermodynamics must embrace human history in its last as well as in its earliest phase. If the physicist can suggest any plausible way of escaping this demonstration, either logically or by mathematics, he will confer a great benefit on history; but, pending his decision, if the highest Will-power is conceded to have existed first, and if the physicist is to be granted his postulate that height and intensity are equivalent terms, while fall and diffusion are equivalent to degradation, then the intenser energy of Will which showed itself in the primitive extravagance of variation for which Darwin tried so painfully to account by uniformitarian formulas, must have been — and must be now in the constant process of being — degraded and lost, and can never be recovered. The process, in physics, is not reversible. (*The Degradation* 195-96)

With its final, eschatological overtones of a cosmic heat death, entropy, was perhaps too much for Adams to resist as candidate for the primary directive of the universe. And, of course, it was science.

The tentative sense of anxiety in the closing chapters of *The Education*, an anxiety that humanity was losing its grip on self-knowledge and self-determination, becomes overt in *The Degradation.* Here the findings of his research would foreshadow ultimately humanity's doom. To the trained eye sensitive to historical change, the evidence was everywhere: "Not a day passes," Adams wrote, "without producing some uneasy discussion of supposed social decrepitude — falling off of the birthrate;–decline of rural population — lowering of army standards — multiplication of suicides — increase of insanity or idiocy — of cancer — of tuberculosis — of nervous exhaustion — of enfeebled vitality — 'habits' of alcoholism and drugs — failure of eye-sight in the young — and so on, without end" (*The Degradation* 187). Anthropologically "man was decidedly a degraded animal reflecting the generally degraded energies of his earthly habitat. Specifically, the intellectual specialization of the human being had occurred at the expense of his physical well-being" (*Degradation* 135). Progress had been made in some fields of human endeavor, to be sure, but that progress was local and specialized. To compound matters, there was precious little coordination between disciplines, no governing mandate by which to sanction the advancement in the name of human welfare. Cosmologically speaking, the net result as regards human progress had been a loss of energy, an overall degradation.

Between the publication of *The Education* and the composition of the essays that would be gathered in *The Degradation*, science and technology had taken a more ominous turn in Adams's mind. In the earlier volume, the promise of a "moral force" which Adams discerned in the dynamo, whose circular humming "would not wake the baby lying close against its frame," is missing. In its place is a gloomy sense of resignation to a future society fragmented and destabilized by the domination of an instrumental scientism and its technology over human life. *The Degradation* is a sober account of the grim fate of the universe. And yet, despite that ominous determination, mankind might still realize, by means of the scientific method, a unified knowledge. Because science was impersonal, the unifying principle it revealed "would not be an intelligence, probably not even a consciousness" (399). What the "kinetic [thermodynamical] theory of gases" demonstrated, so Adams (and many scientists) believed, was not only the secret of matter but an explanation of time itself (heat transfer is not spontaneously reversible; that is, entropy does not decrease, so time can go in

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only one direction toward an increase of entropy). All that was lacking, as far as Adams was concerned, was "whether a still deeper analysis [of thermodynamics] would reduce the atom of gas to pure motion. Thus, unless one mistook the meaning of motion … the scientific analysis commonly called unity was the scientific analysis commonly called multiplicity. The two things were the same, all forms being shifting phases of motion" (*The Degradation* 399).

The "Rule of Phase" which Adams refers to constantly in the concluding chapter of *The Degradation* refers to a formulation by Josiah Willard Gibbs and denotes the possible number of degrees of freedom in a closed system at equilibrium in terms of the number of separate phases and the number of chemical components in the system. It was Gibbs who demonstrated that heat was actually the mechanical agitation of molecules. The Rule of Phase as Gibbs used the term concerned the physical change of a substance once a critical value has been reached; the change is not gradual but precipitous, saltative. Ice for example will stay frozen until a precise temperature is reached whereupon the quantity turns to a liquid. Gibbs's theory was deduced from general thermodynamics in the 1870s and published as "On the Equilibrium of Heterogeneous Substances." Adams had large ambitions for Gibbs's rather prosaic principle. In a letter, he wrote that "what [the physicist] conceded to motion in its phase as matter, he must concede to motion in its form as mind" (qtd. in Wasser 103). Motion then, not force as previously thought, would provide the necessary unifying factor between mind and matter for which Adams had been searching for years. But because molecular vibration did not imply direction, it had to be linked with mind, the sole source of meaningful orientation. The potential implications for Adams's big theory were, he felt, immense. As Wasser explains: "Since the processes of history were irreversible, pressure could be exerted in only one direction. The motive force in history was attraction. Attraction in history was the equivalent of pressure in physics since it, in the historical rule of phase, gave human society its forward movement" (104).

Believing that he had linked the material and immaterial, Adams asserts that "we have learned to recognize that everything, animate or inanimate, spiritual or material, exists in Phase … and that our whole vision is limited to the bare possibility of calculating in mathematical form the degree of a given stability" (*The Degradation* 282-83). Adams can then proceed to reconcile and reduce the respective vocabularies of history and physics. What is commonly referred to as "pressure" in physics is "attraction" in history; "temperature" in physics corresponds to "acceleration" in history. "Volume" works as the same in both (280-81). As for Adams's formative articulation of the rule: "Man's thought, considered as a single substance passing through a series of historical phases is assumed to follow the analogy of water, and to pass from one phase to another through a series of critical points which are determined by the three factors Attraction, Acceleration and Volume, for each change of equilibrium" (281). Adams was convinced the gap between mind and matter had been closed. In summary he explains that, "The historical inquirer may assume that Thought is a historical substance analogous to an electric current which has obeyed the laws of Phase" (283). Confidently he exclaims: "Thus results the plain assurance that the future of Thought, and therefore History, lies in the hands of the physicists, and that the future historian must seek his education in the world of mathematical physics. Nothing can be expected from further study on the old lines. A new generation must be brought up to think by new methods, and if our historical department in the Universities cannot enter this next Phase, the physical department will have to assume the task alone" (283). If we are to take Adams's use of "The Phase Rule" literally as the algorithm subtending the evolution of human history, then knowledge is subject to the same transitory phasic dynamics as matter. Astrology's phasic evolution from action-at-a-distance superstition to the hard causal science we know as contemporary astronomy would exemplify this process. "Intellect," Adams says, "should bear the same relation to Instinct that the sun bears to a gaseous nebula" (*The Degradation* 206) such that "Reason can only be another phase of the energy earlier known as Instinct or Intuition; and if this be admitted as the stem-history of the Mind as far back as the Eocene lemur, it must be admitted for all forms of the Vital Energy back to the vegetables and perhaps even to the crystals" (192-93). Knowledge of new and unknown phenomena may exist as some pseudo-science or local belief which has not yet been 'hardened' by science's rigorous quantification. Adams's analogous use of the comet illustrates the process: "The comet is a sort of brother of Thought, an early condensation of the ether itself, as the human mind may be another, traversing the infinite without origin or end, and attracted by a sudden object of

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curiosity that lies by chance near its path" (301). Premodern notions of comets, their purpose and origin, were mysterious, their appearances used to portend great things, good tidings or debacles. Now we know comets as phenomena composed of stellar dust and ice which issue from the Oort cloud, about one light year away. Their appearance and location in the sky is calculably accurate.

Adams believed that "The Rule of Phase," applied to social history, provided a means for predictive deductions. Because the curvature of the acceleration of civilization "too closely resembles that of the vaporization of water" from a liquid, Adams concluded that a homologous linkage existed between Thought and water via the "familiar law of squares" (*The Degradation* 291). Further analogies between Thought and physical phenomena are warranted, so he believed, when one examines the orbits of planets: "If the calculated curve of deflection of Thought in 1600-1900 were put on that of the planet, it would show that man's evolution had passed perihelion, and that his movement was already retrograde. Calculating that the Mechanical phase has lasted 300 years, the next phase would have a life equal to about √300, or about seventeen years and a half, when — that is, in 1917 — it would pass into another or Ethereal Phase, which would last only √17.5, or about 4 years and bring Thought to the limit of its possibilities in the year 1921. It may well be! Nothing whatever is beyond the range of possibility" (303-08). It comes as no surprise that Adams's application of Gibbs's Rule to human history was neither in his time, nor ever since then, well received. Requests directed to scientists asked to comment were most often met with respectful silence. Contemporary reactions have been even less polite. Critical opinion is much divided over the intent of these final essays. William Jordy relates that Howard M. Mumford, for example, believed the essays were "meant as a joke, to demonstrate the folly of taking a scientific theory of history seriously" (ix). If so, it was a joke on which Adams exhausted the last years of his intellectual life.

Like the paths of subatomic particles in a cloud chamber, knowledge exploded in the later 19th century into a broad spectrum of disciplinary trajectories, branching vertiginously into sub-categories and specialized areas of thought and research. Adams, utterly bewildered and awed on that day in 1900 at the Paris Exhibition, believed he had caught a glimpse of eternity in the spinning, circular movement of that modern avatar, the dynamo. In that vision he sought, like many other modernists, to imbue the impersonality of the mechanical with a deeper, transcendent significance. The circular revolutions of the dynamo, like Windham Lewis's vortex, always in motion yet the same, expressed a sense of calm, composed power, of assurance and quiet control at the center despite the lurching twist and turns of the chaotic world and humanity. Here in the dynamo was a display of energy that was not random and unpredictable but direct and stable, the very ideal of equilibrium between action and stasis.

A critical juncture in human history had been reached at the turn of the century; clearly, as Yeats avowed, the center could not hold, for "the mind had already entered a field of attraction so violent that it must immediately pass beyond into a new equilibrium … or suffer dissipation like a meteorite in the earth's atmosphere" (*The Degradation* 459). For Adams, intellectuals, educators, and scientists, by insisting either on a naive realist or instrumentalist view of the world, missed the opportunity for realizing the potential of science as a unifying grammar of human history. In a letter composed toward the end of his life, he wrote resignedly that "There are but two schools; one turns the world onto me; the other turns me onto the world; and the result is the same: [we are adrift] on a makeshift raft of constructs in an ocean uncharted'" (qtd. in Jordy 236). Regardless of how much force the instrumentalists marshaled by their scientific knowledge and technology, if it were not at some level reconciled, it meant nothing. An epistemology of means only cannot determine direction. In this state of affairs, humans become merely a factor in their evolution, not its agent. Among the new generation of scientists and intellectuals, few seemed to have the will to attempt to unify, so comprehensively, the multifarious energies of modernity under the aegis of humanist progressivism. Henry Adams was not so diffident.

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