

Edison Discusses Intelligent Atoms

General Science

Since this is Edison Year and his incandescent lamp is shining on all sides in honor of its fiftieth birthday, we may appropriately recall one of the few occasions when Mr. Edison was tempted by reportorial persistency to leave the solid ground where he was occupied with practical problems and to indulge in a little speculation about the constitution of matter. So we reprint from *The Monist* of January, 1893, his interview on "Intelligent Atoms" which created quite a sensation at the time and is of peculiar interest at the present time.

One interesting point is his skepticism in regard to the actuality of the ether which was then commonly considered as real as matter but which Einstein has now discarded as an unnecessary fiction, created, as Edison says, by speculative scientists to hold their theories together. But the distinction between matter and energy which Edison, like everyone else of his generation, regarded as absolute is now dissolving away in the focus of modern thought.

Edison's theory; that "the intelligence of man is the sum of the intelligences of the atoms of which he is composed," while doubtless original with him, was not novel to the world. A college graduate might have told him that his new notion was at least 2,500 years old, that it was substantially the same as the hylozoism or panpsychism held by the early Greek philosophers and Roman Stoics and advocated in more modern times by Fechner and Paulsen in Germany and Thomas Carlyle in England. But Edison would not have cared if he had been told of such prior claimants to his idea because he was not proposing to patent it. And if Edison had been a college graduate he would not have thought of thinking up a theory for himself anyhow. He would wait to have the proper theory taught him at the proper time.

Edison's other anthropomorphic idea, that of the loves and hates of the atoms, has also a long background of history and romance. It was a favorite theory of the early alchemists and as such served as the foundation of the science of chemistry. But Goethe, being a rake as well as a scientist, took this good clean chemical term, "Elective Affinities" and, by making it the title of a romance, gave it a downward

trend that dragged it into the divorce court. But the atoms still stick to their strict old-fashioned standards of conduct, no matter what the human race may do. There is no promiscuity among the atoms. Even in the excitement and confusion of a conflagration the carbon and oxygen atoms never lose their heads but seek their mates according to the same laws and instincts as if they were carrying on their courtship in a green leaf on a summer day. If the atoms showed any laxity in this respect, if they should abandon for a moment their peculiar personal preferences for certain other elements, the world would fall into chaos and our own bodies become unmanageable.

In the thirty-six years since this was written scientific experimentation and speculation have been carried on with unprecedented zeal, but most of the questions raised by Mr. Edison—or by the reporters who interviewed him—are still unsettled and his opinions are still pertinent.—E. E. S.

THOMAS A. EDISON in *The Monist*, January, 1893, an article headed "Intelligent Atoms":

My mind is not of a speculative order, it is essentially practical, and when I am making an experiment, I think only of getting something useful, of making electricity perform work.

I don't soar; I keep down pretty close to earth. Of course there are problems in life I can't help thinking about, but I don't try to study them out. It is necessary that they should be studied, and men fitted for that work are doing it. I am not fitted for it. I leave the theoretical study of electricity to the physicists, confining my work to the practical application of the force. It is my belief, however, that every atom of matter is intelligent, deriving energy from the primordial germ. The intelligence of man is, I take it, the sum of the intelligences of the atoms of which he is composed. Every atom has an intelligent power of selection and is always striving to get into harmonious relation with other atoms. The human body is, I think, maintained in its integrity by the intelligent persistence of its atoms, or rather by an agreement between the atoms so to persist. When the

harmonious adjustment is destroyed the man dies, and the atoms seek other relations.

I cannot regard the odor of decay but as the result of the efforts of the atoms to dissociate themselves; they want to get away and make new combinations. Man, therefore, may be regarded in some sort as a microcosm of atoms agreeing to constitute his life as long as order and discipline can be maintained. But, of course, there is dissatisfaction, rebellion and anarchy leading eventually to death, and through death to new forms of life. For life I regard as indestructible.

All matter lives, and everything that lives possesses intelligence. Consider growing corn, for example. An atom of oxygen comes flying along the air. It seeks combination with other atoms and goes to the corn, not by chance, but by intention. It is seized by other atoms that need oxygen, and is packed away in the corn where it can do its work. Now carbon, hydrogen and oxygen enter into the composition of every organic substance in one form of arrangement or another. The formula CHO, in fact, is almost universal.

Very well, then, why does a free atom of carbon select any particular one out of 50,000 or more possible positions unless it wants to? I cannot see how we can deny intelligence to this act of volition on the part of the atom. To say that one atom has an affinity for another is simply to use a big word. The atom is conscious if man is conscious, is intelligent if man is intelligent, exercises will-power if man does, is, in its own little way, all that man is. We are told by geologists that in the earliest periods no form of life could exist on the earth.

How do they know that? A crystal is devoid of this vital principle, they say, and yet certain kinds of atoms invariably arrange themselves in a particular way to form a crystal. They did that in geological periods antedating the appearance of any form of life and have been doing it ever since in precisely the same way. Some crystals form in branches like a fern. Why is there not life in the growth of a crystal? Was the vital principle specially created at some particular period of the earth's history, or did (*Turn to next page*)

College Students Report Dreams

Psychology

Being waked up at uncertain intervals during a peaceful night's rest just to tell an experimenter what you have been dreaming about is all in the night's work at the Colgate University Psychological Laboratory.

Four students who took part in this experiment for seven weeks were able to recall a considerable number of dreams if awakened in the early or late stages of a night's rest, according to F. K. Berrien, who reported the results of the ex-

periment to the *Journal of Abnormal and Social Psychology*. The large proportion of dreams recalled in the early stage he attributes to the fact that the mind is still relatively active with the events of the day.

"As sleep grows deeper the mind evidently becomes less active," he states. "And the dreams are less frequent until wakefulness sets in toward morning. With the onset of relatively lighter sleep the sleeper is more affected by outside stimuli such as noises, the weight of the bed

clothing, and this may account for the increase in the frequency of dreams in that part of the night."

Judging by these four students, the more emotionally stable an individual is, the less that individual dreams.

Dreams are to be looked upon as rather independent phenomena, the psychologist concludes, for no connection with muscle tension or ordinary physiological processes could be detected.

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Edison on Intelligent Atoms—Continued

it exist and control every atom of matter when the earth was molten? I cannot avoid the conclusion that all matter is composed of intelligent atoms and that life and mind are merely synonyms for the aggregation of atomic intelligence.

Of course there is a source of energy. Nature is a perpetual motion machine, and perpetual motion implies a sustaining and impelling force.

When I was in Berlin I met Du Bois-Reymond and, wagging the end of my finger, I said to him, "What is that? What moves that finger?" He said he didn't know; that investigators have for twenty-five years been trying to find out. If anybody could tell him what wagged this finger, the problem of life would be solved.

There are many forms of energy resulting from the combustion of coal under a boiler. Some of these forms we know something about in a practical way, but there may be many others we don't know anything about.

Perhaps electricity will itself be superseded in time, who knows? Now a beefsteak in the human stomach is equivalent to coal under a boiler. By oxidation it excites energy that does work, but what form of energy is it? It is not steam pressure. It acts through the nerve-cells, performs work that can be measured in foot pounds, and can be transformed into electricity, but the actual nature of this force which produces this work—which makes effectual the mandate of the will—is unknown.

It is not magnetism, it doesn't attract iron. It is not electricity—at least such a form of electricity as we are familiar with. Still, here it is necessary to be guarded, because so many different forms of electricity

are known to science that it would be rash to say positively that we shall not class vital energy as a form of electrical energy. We cannot argue anything from difference in speed. Nerve-force may travel as fast as electricity, once it gets started. The apparent slowness may be in the brain. It may take an appreciable time for the brain to set the force going.

I made an experiment with a frog's leg that indicates something of the kind. I took a leg that was susceptible to galvanic current. The vibration produced a note that was as high as a piccolo. While the leg was alive it responded to the electrical current; when it was dead it would not respond. After the frog's leg had been lying in the laboratory three days I couldn't make it squeal. The experiment was conclusive as to this point: The vital force in the nerves of the leg was capable of acting with speed enough to induce the vibration of the diaphragm necessary to produce sound.

Certainly this rate of speed is greater than physiologists appear to allow, and it seems reasonable that there is a close affinity between vital energy and electricity. I do not say they are identical; on the contrary, I say they are very like. If one could learn to make vital energy directly without fuel, that is without beefsteak in the stomach, and in such manner that the human system could appropriate it, the elixir of life would no longer be a dream of alchemy. But we have not yet learned to make electricity directly, without the aid of fuel and steam.

I believe this is possible; indeed, I have been experimenting in this direction for some time past. But

until we can learn to make electricity, like nature, out of disturbed air, I am afraid the more delicate task of manufacturing vital energy so that it can be bottled and sold at the family grocery store will have to be deferred.

Electricity, by the way, is properly merely a form of energy, and not a fluid. As for the ether which speculative science supposes to exist, I don't know anything about it. Nobody has discovered anything of the kind. In order to make their theories hold together they have, it seems to me, created the ether. But the ether imagined by them is unthinkable to me. I don't say I disagree with them, because I don't pretend to have any theories of that kind, and am not competent to dispute with speculative scientists. All I can say is, my mind is unable to accept the theory. The ether, they say, is as rigid as steel and as soft as butter. I can't catch on to that idea.

I believe that there are only two things in the universe—matter and energy. Matter I can understand to be intelligent, for man himself I regard as so much matter. Energy I know can take various forms, and manifest itself in various ways. I can understand also that it works not only upon, but through, matter. What this matter is, what this energy is, I do not know.

However, it is possible that it is simply matter and energy, and that any desire to know too much about the whole question should be diagnosed as a disease; such a disease as German doctors are said to have discovered among the students of their universities—the disease of asking questions.

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