THE

REVELATIONS

OF NATURE

A Philosophic Essay
Based on
Many Discoveries of Mighty Import
Made by the Author
and Divided in Three Parts

LEONIDAS GUILLEMET
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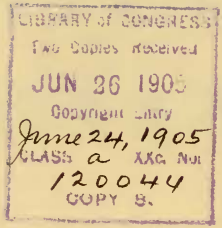

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PREFACE.

The reader who may not agree with the views expressed in this essay is respectfully requested not to pass judgment upon them offhand at first reading, and to cast off any prejudice. It will generally take several readings before everything said is fully grasped, engraved and correlated in the mind for permitting impartial criticism. Any proposition never heard of before may seem an absurdity at first sight and yet may become an obvious truth subsequently. That is because it usually takes time for the human mind to become accustomed to new ideas. That is also why the first literary work of authors who are not imitators is seldom appreciated before they have acquired fame.

Without making any claim to literary ability the author feels that the intelligent reader should find in this book abundant food for thought and that is its essential purpose.

THE REVELATIONS OF NATURE.

PART I.

Discoveries Unparalleled Since the Time of Newton.

Perpetual Motion is Solvable and Solved.

INTRODUCTORY REMARKS.

The writer has none of the ponderous authority which gives real (or fictitious) weight to anything said or written by persons whose scientific standing and position give them prominence. His share of knowledge on scientific subjects and any subject is only a very minute fraction of that possessed by such persons. He is simply a "man in the street." Therefore he does not claim to possess what is generally conceded to be the highest order of education or learning, but he claims to be able to give some pointers on some subjects to those who possess such advantages. At all events, he gives here some of his thoughts for scientific men to weigh and scrutinize if they have the leisure and patience. (Those approached hitherto had apparently neither.)

He is not looking for any authorities on the subjects treated, but pretends to have made great discoveries, and if there is any authority in the matter, he is that authority. The reader may and should take it for what it is worth if he can find out and no more. True, he, (the writer), has no precious "reputation to lose," but he has one to make and is not so much indifferent as to what may become of it. He does not wish to appear pretentious; there is no pretension about it at all, but what he has to say will be said without restraint as to matter of form. This is not a question of fine academic style, conventionalities or sham modesty, but one of truth. Being merely seeking the truth he shall ever be found willing to retrace his steps whenever found on the wrong path, provided reasonable evidence is adduced.

Most writers studiously avoid the use of the pronoun "I" as much as possible, using "we" instead most frequently. This is akin to the ancient custom of hiding the number 13 under the cover of "12 bis," so the gods could not see it. The leap over to 14 was thus safely accomplished. For my part I will not try to conceal my identity and put the responsibility for what I say upon somebody's else shoulders, for I am only one and don't pretend to be many. Being the writer of the

book I can see no good reason for hiding behind a screen, as this would make mighty little difference to the value of what is said. Therefore I will say I I I, whenever that expression is the most handy and suitable. This is a free country. Foolish customs of all shades are plentiful enough to make comfortable upholstery to sit on.

PERPETUAL MOTION.

The scornful haughty disdain with airs of commiseration of scientific men for the seeker after the Perpetuum Mobile and their heaping of slur, ridicule and abuse upon his head, trusting in their exalted superior knowledge, is something proverbial and universal. "It is no use talking, you cannot get something for nothing," they say, or something equivalent. Well, no, not so long as you don't know how, (and the knowing how is something), but such an assertion is presumptuous in the extreme, and utterly unwarranted and unjudicious so long as all the forces and secrets of Nature are not fully understood, and it does not appear that they are. "You cannot cheat Nature," they say again. No, but oh! how beautifully Nature can cheat you, as she has done so many a time without any scruples with scientists who pretended to set a

limit to her powers. Of course, perpetual motion without means to generate energy permanently is an impossibility, as far as present knowledge goes at least, but to find such means is not, and these being found, it is perpetual motion all the same, or something on the same plan if you please, and science does not admit the possibility of the one any more than that of the other. The very mention of perpetual motion is a scarecrow. It is an absurdity born of human vagaries. Such notion is the rankest nonsense and is good only for ignoramuses and cranks. Here is a sample of what science has to say from the Encyclopedia Brittanica: " . . . If a man likes to indulge in the notion that, after all, an exception to the law of the conservation of energy may be found, and provided he submits his idea to the test of experiment at his own charges without annoying his neighbors, all that can be said is that he is engaged in an unpromising enterprise. The case is otherwise with the projector who comes forward with some machine which claims by the mere ingenuity of its contrivance to multiply the energy supplied to it from some of the ordinary sources of nature and sets to work to pester scientific men to examine his supposed dis-

covery, or attempts therewith to induce the credulous to waste their money."

So, lofty science holds its foot upon it and Nature cannot help it if she would. It is clear, therefore, that science will have nothing to do with it; so much so that the announcement to that effect was made by the French Academy of Sciences over a century ago, (1775) and has been closely adhered to by all scientific bodies ever since; so that we shall have to do without science, taking this bull by the horns. This is a nut hard to crack, but with the proper tools it can be done. Moreover, at the present day this attitude of science is probably more a question of terms employed for expressing an idea than an objection to the idea itself, for a great many scientists assume that some inexhaustible source of energy might incidentally be discovered; many think it will. But if that source is not to be discovered in the known forces of Nature, there is a great deal less likelihood of its being found in any unknown force or the less understood, or in some imaginary entity, such as the ether. The secrets of Nature do not drop down in a bundle with everything explained.

Many scientists usually style it a great audacity when they advance some notion out of the usual run with or without, (more often without), Nature's testi-

monials. There may be audacity in presenting a bogus check at the bank counter, but the bearer of the genuine is fearless, no matter what the figure involved may be.

Nature finds the means to move the universe for nothing, but our scientific men appear to think that God once gave it such a tremendous kick as a starter that it will never stop. This was a centrifugal kick, of course, or otherwise central anyhow.

Thus while perpetual motion at retail, as applying to mechanics, is emphatically declared an impossibility, it is fully admitted at wholesale when applying to the motion of the universal machine. But it so happens that science holds precisely the wrong view in both cases, for the universe could not move without expenditure of energy any more than our machines, and our machines as well as the world can find in Nature an everlasting supply of energy to move them when we know how. The writer assumes that he does know and is positive about it. The motion of the universe is purely mechanical; the forces moving it and those which move our machines are the very same ones. Or would they exist merely for the delight and convenience of man, who does not even understand them? He may well believe that as he

once believed the whole universe was revolving around him for the same purpose. In the Newtonian gravitational theory, heat, electricity and magnetism (which are real forces, not effects of force) are not assumed to be a factor in the motion of the universe, since according to said theory the universe moves without expenditure of energy. Newton discovered gravitation, but did not discover the cause of it. His explanation of the phenomena which was at first appearance a working hypothesis was good enough for his time, since none better could possibly be found then, but it is time at last to hammer down this old crumbling relic which has done duty for two centuries and is now blocking the march of progress.

The very existence of the real forces of Nature creates the inevitable necessity of a perpetual and universal motion, for said forces being everlasting are forever at work, and as they do that work without the assistance of man, they can move his machines permanently, too, provided he makes the right ones. These things in time scientists will find out, but it can hardly be expected that they will do so at once. Old rooted and universal prejudice takes time to die out. An eminent psychologist in treating of the actions of the mind says: "It is miraculous how little judgment even

scientific men often use when investigating a thing about which they have preconceived notions." As far as the experience of the writer goes, this is absolutely true, and the story of the subversions in doctrines and opinions concerning scientific and other subjects abundantly prove it. Such subversions take place very slowly and not at once, even in the light of absolute evidence which clearly establishes a new truth. This accounts for the struggles and persecution of the authors of many great discoveries. Great discoveries are great principally from the fact that they meet with opposition and obstacles from all sides. Preconceived notions are comparable to and probably related with hypnotic suggestion which blinds the reasoning faculties. In any event, they usually show a lack of independence of judgment with too much reliance on the judgment of the majority or that of some authority and the length of time this judgment has been upheld.

If a wrong view concerning any particular thing has been handed down from age to age for ten thousand years, this will not make it right any more than if it had been upheld only for ten minutes, but it will be immensely more difficult to set aside and few will be found to dispute it. This disposition of man's mind is directly responsible for the perpetuation of errors.

But if science is slow in recognizing its errors, the truth is bound to come to the surface in the end nevertheless. Every great discovery that is coming to light in our day should convince scientific men of the conservative school that they know mighty little about the secrets of Nature, but they do not feel that way, although they sometimes profess to do so, yet will unhesitatingly proclaim the absurdity of any startling but unverified discovery that does not match with their accepted formulae without even taking the trouble to look into it carefully or not at all. What is not possible in one way or any known way does not necessarily imply that there is no principle in Nature which makes it possible, even if looked for in vain for centuries.

Of course there are many fallacies in alleged discoveries, but there are many fallacies in the teachings of science, too, and scientists never realize it until their teachings are thoroughly shattered. Conservative, classic, pure (?) science is content to stand on long trodden ground, even if it is a blind alley and there "zealously guards its acquisitions," only to see them vanish one after another.

The following paragraph extracted from a humorous article headed "Science and Common Sense," by

George Bernard Shaw, and reproduced in the English Mechanic and World of Science (Eng.) of April 13, 1900, is a little gem. Here it is:

"Science is the whole fascinating body of speculation concerning what we do not know. The fact that science claims with absolute conviction a special and sacred infallibility of its own which distinguishes it from the superstition of the augur and soothsayer, the medicine man and witch doctor, the faith healer and medium, the yogi and lama, the priest and parson, is the conclusive proof that it is generically identical with them, since they all make that very claim with that very conviction."

This is probably even more true than the author had in mind. If all the absolute scientific knowledge —I mean absolute truth—were put together in a scale, it would make a very poor showing indeed. Theories and doctrines succeed each other as night succeeds day, but none is assured of perfect stability as to basic causes, and without knowing the causes we cannot fully understand the effects. Furthermore, there are many different views in scientific as well as in religious matters. In both cases this diversity of opinion is caused by the influence of "suggestion" a great deal more than by that of truth.

Yet with all that it cannot be gainsaid that true scientific investigation and research is the principal base of all progress, but dogmatism born from preconceived notions is its stumbling block.

I fondly hope that truly progressive scientific men will not get mad at the little teasings contained herein, as they are not intended for them, but will assume that those who might feel incensed at any of the foregoing and subsequent remarks are the reactionary element which has to be fought to the teeth as usual every time a departure marking a step forward in any direction is advanced.

Concerning the views expressed here, however, we need not quarrel. Every one can have it all his own way who don't like my way, but am prepared to receive without flinching the usual abuses and ridicule generally served to innovators. I should like, however, to find out whether the impartiality and good faith of the world of science in its quest after truth is real or only a pretense where sect, cast and dogma are the ruling principles.

As regards perpetual motion, all former attempts at solving it were necessarily doomed to failure, except possibly in one instance, because no way and principles permitting to get something for nothing or

something that cost nothing if you prefer, had been discovered.

What is the one case in which the attempt had any chance of success? It is not very old; it was a living issue in the press a few years ago, although all that was said was of course in vehement condemnation of the heresy, which the writers thought they had buried so deep that it could never again come to the surface. It was the case of Mr. Tripler of liquid air fame. He did not appear to have really discovered any great law or principle of Nature and was merely groping about in the dark, but he was on the right track without knowing it. He, and no doubt many others, had probably secret hopes of reaching the goal, but he dreamed of a thing that he apparently could not handle properly, and he denied some statements attributed to him, as published in an article on liquid air in the McClure Magazine for March, 1899. In this said article Mr. Tripler is represented as repeatedly asking, "What becomes of all this heat anyway?" (That whose removal or disappearance in some way caused liquefaction of the air in his machine.) Mr. Tripler was puzzled, but did not give the answer to this burning question, which is a most vital one, and his traducers disposed of it by simply ignoring it, some of

them giving instead some calculations which prove nothing at all concerning the unknown quantity—the secrets of Nature.

Nearly one year before this question appeared in print in the said article, (April 12, 1898), the writer happened to pose the same question to himself and claims to have discovered the answer at the same moment. It is given hereinafter.

LIQUEFACTION OF GASES.

It was early held that the heat of compression of a gas was generated by the act of compression itself, but subsequently this theory was upset and another theory substituted therefor in which it is assumed that the heat of compression is caused by a condensation of the normal heat of the gas. At the present time there seems to be a revulsion toward the earlier theory, or rather uncertainty or indefiniteness as to what really takes place.

In any event it is assumed that the reason why a gas liquefies is because some of its heat is extracted from it when not liquefied by pressure alone.

Then a great problem in physics presents itself here whose true solution is of momentous capital importance. The question is this:

When a gas is liquefied by mechanical means is its normal heat really extracted from it, or is the heat made to disappear from the gas by any other action than that of extraction or radiation into space, which is equivalent?

If it is the normal heat of the gas that is extracted by the cold water usually used in refrigerating plants, then this normal heat must be condensed by the act of compression of the gas and elevated in degree by the condensation.

But we will presently see that this notion of the normal heat of the gas being extracted is an amazing absurdity and that the heat which is extracted by cold water or other agency was created by the act of compression of the gas.

This is the case at least for all the heat exceeding in degree the normal temperature of the gas before compression.

I would say in the first place that the capacity of a gas for retaining or absorbing heat does not change whether it is under pressure or not. 100 cubic feet of atmospheric air, for instance, condensed into one cubic foot contain just as much heat as before the condensation if the temperature is the same. Otherwise what

would give it the 100 atmospheres pressure it contains?

Is it not heat that develops pressure within a confined fluid? What would give confined liquid air the capacity for developing a pressure of 800 atmospheres on reaching the normal temperature if it could not contain normally as much heat in the confined as in the non-confined state, and that without showing any difference on the scale of temperature? If any part of the normal heat contained in a volume of gas could be squeezed out of it the whole of its heat could be squeezed out for that matter, and as long as the gas should be prevented from expanding it could not again reabsorb the normal heat it contains in the free state or even part of same. Compressing a gas by mechanical means without adding to its normal heat has in one sense the same effect as adding to its heat without compressing it by mechanical means, i. e., in both cases it is brought under stress if confined, and in both cases it is the heat contained within it that causes the stress.

When a gas is under pressure it is really the heat it contains that is under pressure, but the heat shows no difference of degree, it only shows a disposition to expand with the gas that contains it. This is also

proof that both heat and cold are contained by matter and that where there would be no matter neither heat nor cold could exist.

Void space can have no temperature.

Then if at the normal temperature of the atmosphere a given amount of air contains an equal amount of heat whatever be the pressure, it is quite evident that the heat of compression which is of a degree higher than the normal does not form part of the heat contained in the air before the compression, but was generated by the latter and is added to the original heat of the air, but gradually radiates into space or is otherwise extracted. Consequently the extraction of this heat of compression does not extract any of the original heat of the air or any other gas. The reason it is of a higher degree is not because the normal heat was condensed, for if it could be condensed by compression of the gas so as to rise on the scale of temperature, the removal of the excess of heat above the normal after compression **should also remove the pressure,** and with no pressure in the gas, the latter could only expand gradually by reabsorption of heat. (This it does only after liquefaction.) By compressing the gas further and further and removing the heat of compression at the same time, the gas would finally liquefy

at the normal temperature, but **no temperature below the normal could be attained.**

However, the removal of the heat of compression only removes the excess of pressure caused by it; that is because none of the original heat of the gas is removed so long as the temperature of the heat absorbing agent is not below the normal temperature of the gas. If the water employed for removing the heat of compression had a temperature below its normal at the time of using it, then some of its normal heat would have to be disposed of before employing the water for cooling the gas.

When a gas under pressure is allowed to expand suddenly or continuously through a narrow nozzle, however, some heat disappears to be sure until the gas liquefies, and here comes the rub. Is the heat destroyed? Heat being a force of nature, how can it be destroyed?

In the method now used for liquefying air on a commercial scale known as the regenerative process, one type of which is embodied in the Linde's machine, the air under pressure expanding continually through a needle valve or nozzle is cooled to such an extent that part of the expanding air is liquefied on issuing out of the nozzle, and that which does not liquefy is

yet cold enough to cool the air rushing toward the nozzle. **Consequently it does not carry with it the heat of that part of the air which has been liquefied on expanding since it is itself colder than before expansion.**

It is evident, therefore, that it is the act of expansion that causes the disappearance of the normal heat of the air. What becomes of it?

I take no stock in the latent heat story, at least as far as gases are concerned. It has no place here anyway, for it would be the same thing as to say that one gallon of liquid air contains as much heat as an equal amount of air at the normal temperature, but that in one case the heat is apparent and in the other latent, which need no refutation.

The explanation of science varies to suit the circumstances. In one instance science says that the heat is extracted, and when this explanation does not suit the case, science says that the heat is rendered latent. Which is which? Neither. For instance, in reference to the liquefaction and evaporation of air in a report from the Patent Office refuting my views, I see the following curious statement, which, however, is apparently in accordance with present scientific notions: "Heat is merely transformed into intermolecular energy, i. e., the air in vaporising absorbs

the latent heat of air vapor." If this has any admissible meaning I fail to grasp it and it reminds me of Voltaire's definition of metaphysics: "When two men are talking together and that the one who is talking does not understand himself while the one who listens seems to understand, that is metaphysics."

Other scientific statements are that when a compressed gas expands its heat is rendered latent, which eventually causes it to liquefy. If the heat is extracted it is not rendered latent; if it is rendered latent it is not extracted; yet it would have to be both to explain all the phenomena connected with the liquefaction and the evaporation of gases according to the present views of science. It might be contended that a part of the heat is extracted and the other part rendered latent, but such argument could not hold water. Nature's laws do not operate half one way and half the other way.

As regards the liquefaction of air the heat is not absorbed by anything; neither is it destroyed but only transformed. Transformed into what? It is not transformed into work as the present admitted theory would have it; this is another absurdity as will be seen presently. **The heat is transformed into cold, and cold being transformed heat is a force of Nature!** The

sole fact that a temperature below the normal average temperature of bodies at any given time or latitude can be attained at all as well as a temperature above said normal is a positive proof that cold is a force whatever may be the means used for producing it artificially. It is well known that the evaporation of a liquid or solid produces cold, but this is clearly a physical action which has nothing to do with extraction of heat; it is rather external heat which causes the evaporation and is thereby transformed into cold. This is what is proven by Pictet's experiments described in the Scientific American of March 31, 1900, in which the heat absorbed by the liquid air in his apparatus, not only at the surface but within the mass of the liquid, causes it to evaporate while the evaporation destroys this heat as such.

The theory of latent heat is a myth which was accepted for lack of any better explanation. The fact, for instance, that a determined amount of ice absorbs a determined amount of heat to melt it all before the melted ice can get warmer than the ice itself is meant that a determined amount of ice can transform a determined amount of heat into cold and no more than that amount. The same may be said of water evaporating into free space; about four-fifths of the heat put

into the water is transformed into cold by the evaporation, but the heat is not transformed when the evaporation takes place into a closed vessel because the space for expansion is limited. Any other related phenomena may be explained in an analogous manner. There is no reason whatever for assuming that the evaporation of warmed water does not generate cold as well as the evaporation of any other body at normal temperature. Evaporation wherever and whenever it occurs is a physical action whose effect is the transformation of heat into cold when taking place in the open free space, and not an absorption or a hiding of heat. This is thoroughly in accord with observed facts and I propose to demonstrate it by practical experiments. That will be the end of the fancy latent or hidden heat which has been playing hide and seek in the minds of scientists since the advent of Blake's theory. Really, heat and cold are the opposite poles of a single **force of matter** which is **temperature,** and this is the key that will unlock many priceless treasures of Nature's secrets.

If cold were not a force or else one pole of temperature, how could it contract or condense matter? If cold were nothing in itself but merely the more or less complete absence of heat as at present held by science,

the removal of the heat should leave the matter in the state of expansion it had acquired by the presence of the heat and no **contraction** or **condensation** could ever take place of itself after expansion whether the heat were present in the matter or not. Yet we know that the force of contraction is a tremendous one which in the case of freezing water takes the expansive form and is capable of producing a pressure estimated at 30,000 pounds per square inch, or about three times as much as could be secured from confined liquid air. Every rain drop tells us that this drop was formed by the attractive force of cold; no rain drops could be formed without such an attractive force since condensation involves molecular motion of matter, and **contractive molecular motion is just as much an effect of force as expansive molecular motion.** This is such a self-evident proposition that it is to be wondered why it was ever viewed otherwise. And if any one still clings to the theory that cold is nothing, let him burn his fingers with liquid air and this may possibly have a more persuasive effect than words, unless he prefers to believe that it is heat only that burns, even when it is absent.

Then cold being transformed heat, heat is trans-

formed cold for that matter, but this subject will be taken up again farther on.

No heat can be transformed into work for the very simple reason that heat is a force of Nature and work is not. In other words, heat is a cause, indestructible, though variable in form or degree, while work or motion is only an effect which lasts only as long as the cause is in action. So that the transformation of heat into motion would mean its absolute annihilation in all forms with nothing to take its place.

Work is a result of the transformation of heat into cold or of cold into heat and is an effect which may or may not be produced by either form of transformation, though, of course, molecular motion must invariably take place in either form. The heat required to operate a steam engine for instance has been evolved out of cold, but none of the heat has been transformed into work. It is one of the many cases of creation of multiple, different effects by a single cause observable in Nature, which will be referred to again.

The doing of work may store some potential heat in some forms, such as the lifting of weights that remain lifted, and part of this potential heat can be recovered by means adapted to cause its appearance

by the fall of the weights, but if heat were transformed into work, where is any potential heat to be found stored in liquid air? The cold is all that remains to show for the work done in liquefying it and for the vanished heat, while the work itself as an entity is no more. The work performed is the creation of cold out of heat which is transformation.

Some argumenters may say that as heat is destroyed one way by the expansion, it is created the other way by the compression and that there is therefore compensation and no real loss of heat. Even if valid their arguments would not prove that heat is ever transformed into work or invalidate the contention that heat is transformed into cold, for the heat that disappears by expansion and that which is generated by compression is not the same heat singled out as distinct from the normal; the creation and disappearance of heat are not necessarily simultaneous in the process of cooling a gas. But besides where is any compensation to be found for the heat that disappears by expansion when the pressure has been secured without the production of any heat of compression, such as would be the case if liquid air were confined into a closed vessel until it had reached the normal temper-

ature? **In that case the expansion of this air would destroy heat with none to compensate for its loss.**

When a gas is compressed by mechanical means, the act of compression generates heat, and if this heat could not be removed it would stand in the way and effectually prevent all possibility of liquefying the gas, but as it can be removed, after it is removed the expansion of the compressed gas generates cold which may be considered the equivalent of the removed heat, and this provides means to reach the point of liquefaction of the gas. The heat of compression created in liquefying a gas is then compensated by the cold of expansion through which an initial supply of liquid may be produced, and it may be assumed that this heat of compression would be sufficient to bring the liquid back to the normal temperature of the gas, so that so far there would be no loss or gain of heat. On the other hand, when a supply of the liquefied gas has thus been secured, if the liquid be confined in a closed vessel it will soon develop pressure by the obsorption of heat, and this heat is bound to be destroyed or transformed, since the pressure in the gas cannot be removed without this action taking place. Assuming that it is the heat of compression itself that is put back into the liquid after confining it, the original

amount of heat would still remain unchanged, but the gas would be under a tremendous pressure and this would not be removed without producing cold for which there would be no more heat as a compensation. This gas would then be in condition to cool and liquefy itself again and this time there would be no heat of compression to put into it to bring it back to its normal temperature. The operation being once started in a suitable machine, the transformation of heat into cold would go on indefinitely and the machine would be a Cold Engine, since it is the creation of cold that would generate energy, in the same way that it is the creation of heat that generates energy in a heat engine of any type.

It must be apparent therefore that the spontaneous appearance and disappearance of heat as occurring in compression and expansion respectively of any gas are opposite effects caused by physical actions. But it seems that heat is being constantly transformed into cold on the whole surface of the earth in many different ways, and it appears even likely that whenever any two or more bodies at different temperatures are brought together so as to make them equalize in temperature, some heat is transformed into cold.

Thus when one volume of water at 0° C. is mixed

with an equal volume of water at 100° C. the temperature of the mixture is found to be 44° C. instead of 50, which shows that 12° of heat have disappeared since we have 100° of heat in one volume of water and only 44° in twice that volume; twice 44 is 88 and 12 short of 100. The disappearance of heat would probably increase as the proportion of cold to hot water were increased, and also with the increase of difference between the temperature of the hot and cold water. This probably contains the true explanation of the alleged transformation of heat into work when the heat is doing work. This apparent transformation of heat into work would in reality be a transformation of heat into cold caused by the slowing up of the expansion of steam in doing work giving it more time to cool or equalize with other bodies. It is no doubt also the reason why unaccountable losses are found in all transformations of energy. What takes place between heat and cold must equally take place between electricity and magnetism.

I have devised some practical apparatuses for liquefying air with liquid air without any fuel being required; said apparatuses employ new physical and mechanical principles which would make my ideas

much more apparent if I could describe them here, but cannot do so before my rights are fully protected. While no trials of my invention have been made, some trials will be made in time and I long for the day when I will be able to give practical demonstrations that will amaze the skeptics. In fact, I sincerely regret to give this for publication before being able to give such demonstrations, but as usual with most great practical discoveries, skepticism has been in my way so far and I must attempt first to dispel it in part at least. "There is something in the air" this time, and it is neither a castle nor a rainbow, neither a Keeley fraud.

While what has been said before would be sufficient to establish the fact that cold is transformed heat, further demonstrations of this fact may be given, as it is in a large measure a foundation for all the rest, but all the rest tends also to establish the fact directly or indirectly by reciprocal inductive evidence. Besides this fact is the backbone of my inventions, and I frankly admit that if I were mistaken in regard to it, they could in all likelihood be classed among the many schemes that have failed; but my inventions themselves will prove the strongest evidence of my allegations, and in fact said inventions were the direct cause

of my discovery of the true nature of cold; so that invention preceded discovery, which shows that invention and investigation go hand in hand and that invention may lead to discovery as well as discovery to invention, contrary to the views of scientific investigators and teachers who consider the inventor as a follower in their lead. In fact, invention itself is a kind of discovery. Thousands of inventions in electricity have been made but our scientific investigators have not told us yet what electricity is.

INVERTED METHODS OF LIQUEFYING GASES. CREATION OF ENERGY.

I will say here that the act of refrigeration and liquefaction of air (or apparently any other gas) can be inverted in such a way that this very act itself **will generate energy instead of spending it.** This is something which science had not foreseen and it is based on principles easy to understand, but which are not mentioned in the accepted laws of thermo-dynamics. These principles being properly applied will give us not merely a surplusage of energy but a totality; i. e. The source of energy available to draw upon is at least the whole difference between the temperature of solid air and that of the atmosphere.

The steam engine itself is really a perpetual motion

machine, provided the feeding of fuel and water is perpetually maintained, but the steam or other heat engine is made to work by running in opposition to the natural run of the forces of nature. This natural run upon the earth is for heat to disappear in proportion as it is supplied by the sun. My machine simply helps and forces this heat to disappear faster and thereby generates energy.

So while a heat engine is made to do work through the production of heat, the cold engine will do work through the destruction of heat or the production of cold. It is a case of inversion in invention in the same way that an electric motor is an inverted dynamo, for instance: As an illustration, a heat engine may be compared to a floating craft forced to go up stream, and a cold engine to a craft carried down by the stream. This should give a clear notion of the kind and import of the discovery and invention I have made. This may seem incredible, but I feel satisfied that there is no mistake about it, and the Patent Office, probably for the first time in its history, has stopped maintaining that perpetual motion is an impossibility, although for obvious reasons it does not care to endorse any responsibility by expressing an opinion one way or the other before practical demonstrations have

been made. Such opinion was once asked for and denied as I expected. Yet since then other applications for patents have been made which hit the nail square on the head. The principles are there and the force is there.

If two men are pulling on a cart trying to draw it in opposite directions and the men are of equal strength, the cart will not move, but if one of the men lets go, the other will have a chance to draw it, and his effort will be reduced by one half if the first man pushes in his (the second man's) direction instead of pulling in the opposite. This figuratively illustrates the difference between the present methods of liquefying gases and my inverted method, or rather methods, for I have discovered more than one. The two men may be considered as personification, one of the heat of compression, the other of the cold of expansion, or as the poles of temperature.

Another illustration will give a first notion of how energy can be manufactured ad infinitum.

The absurd doctrine of the conservation of energy will be looked into farther.

Something is invariable in amount, but it is not energy; it is the force of matter, like matter itself, which makes the energy.

We will suppose in the first place that we have one gallon of liquid air and any number of vessels, each containing one gallon and each strong enough to hold one gallon of liquid air enclosed within it without bursting after the air is brought back to the temperature of the atmosphere. We will suppose next that our gallon of liquid is inclosed in one of these vessels. We may remark that it will take no material expenditure of energy to pour the gallon of liquid into the vessel and to close the latter. We suppose again now that all the cold contained in this gallon of liquid can be extracted from it and transferred through the walls of the vessel to an equal amount of air taken at its normal temperature.

At the end of the operation we will have another gallon of liquid air which can be bottled in turn, without expenditure of energy.

Our first gallon of liquid will now be in the gaseous state and under a tremendous pressure, but the vessel will keep it under bounds. Following the same proceeding, with our second gallon of liquid we can make a third; with the third a fourth, and so on indefinitely, all without material expenditure of energy except that required to make our first gallon of liquid.

After each vessel is thus filled with air will it con-

tain energy or not? Where did it come from? Each vessel will be full of air under a pressure of ten thousand pounds per square inch. I could prove that this would represent energy enough in each vessel to make at least two gallons of liquid air if handled the right way, but this would involve explanations which are not essential here and we may suppose that only one gallon of liquid air could be made with that energy. If we had filled say, only ten vessels, we would have now ten gallons of liquid or the equivalent in compressed air, and each gallon of liquid could make ten more in turn or any quantity. No magnifying glass is required to see what that means. The first gallon of liquid is truly the seed that multiplies.

Of course we will have to provide the means for transferring **all** the cold from one volume of air to another and equal volume and the reader may not see just how this can be done, but the fact is that **it can** be done; if it is not that exactly, it is something that for practical purposes amounts to the same and better still.

Skeptics may not take that for granted, however. Very well. In any event they will no doubt agree that the potential energy contained within one gallon of liquid air is a certain determined quantity and no

more or less, and that it also contains a determined quantity of cold which is not at all the same thing, for in order to make use of this energy in the usual way we must first remove the cold. Why then should that cold be wasted when it costs so much energy to get it by the present methods and any gas will absorb it avidly, thereby storing energy within itself if segregated at the same time that it is cooled and that without absorbing any of the energy contained in the confined gallon of liquid?

One confined gallon of liquid air can liquefy by contact several gallons of ammonia gas for instance, and after liquefaction the latter will contain almost as much potential energy as the gallon of air. I defy the world of science to show that the latter energy is not created brand new.

The amount of energy expended in making the gallon of liquid air may be several times larger than that contained within it and the ammonia liquefied by it combined, but this has nothing to do with the proposition. Theoretically, no more energy should be expended in making one gallon of liquid air than is contained within it after it is made, if the right process and perfect machine were made use of, even without the creation of new energy. **But all the cold imparted to**

a gas by abstraction from a liquefied gas represents new energy. The question is to provide a machine that saves it and continues indefinitely to make more. That is easy enough when one way to do it is known.

Then if energy can be thus manufactured, it can be destroyed. This is the natural, inevitable sequence; and for the same reason what can be destroyed can be created. Not so with the forces of matter, however, one form of which forces is temperature.

As far as known, a temperature, whatever its degree may be, is something ever present in all kinds of matter; it is therefore indestructible, for even if temperature could be made to disappear from matter, something else would take its place, in consequence of which the saying that "there is no matter without force or force without matter" is true, but science has not yet grasped the full scope of this proposition advanced by itself, for it is a direct contradiction of the notion that perpetual motion is an impossibility.

We have in the tides of the atmosphere and of the sea another example of perpetual motion, but science refuses to see it in this light. The tides are said to be caused by the attraction of the moon and the sun upon the earth, and according to Newton's theory, in which the motions of the moon and sun take place without

expenditure of energy, it would follow that we have in the tides the justly ridiculed "something for nothing" of perpetual motion fame; that is energy created permanently out of motion taking place without expenditure of it.

In this regard Nature has shown herself inexorable so far, and if it were not to remain so, it could be only through another great discovery. No one can prove that such discovery will never be made, but our deductions must remain within the bounds of actual knowledge with our limited senses of perception and reasoning faculties. Infinity, for instance, is beyond the grasp of human intellect in its present terrestrial stage, and we little know what more there is. Even lower animals possess senses of perception we do not possess, and since there is anything that man cannot possibly apprehend, he should forcibly infer that he has not reached the highest plane in the order of intellectual beings which must necessarily people the boundless visible and invisible universe, and that he is too small to judge definitely of the unknown from what is known or supposed to be. There is nothing impossible to the Omnipotent and man is said to have been made to His Image, which if true would imply that there is nothing impossible to man, small as he is.

Returning to the tides, if it is assumed that the tides are drawing on energy stored in the motion of the moon, it should not take a very long time for the tides to cause a marked decrease of speed in said motion, considering the small size of the moon and the vast sum of energy perpetually expended in the tides, and this would finally bring about the fall of the moon upon the earth.

Most of the bodies in the heavens being probably surrounded by some fluid, either liquid or gaseous, the perpetual independent motion of these fluids alone would gradually stop the motion of the universe, bringing together all the matter composing it. Calculations of the heat evolved and what would happen if two big celestial bodies should fall upon each other are no doubt a harmless pastime, but such calculations are usually based on the assumption that the fall should be in a straight line, and no such direct fall could ever occur between bodies forming part of a regular solar system. The fall would take place by gradually drawing nearer and by shortening of the orbits. It does not appear that even meteorites ever fall upon the earth in a vertical line.

The tidal motion of the gaseous and the liquid parts of celestial bodies which represents a vast expenditure

of energy would in time absorb the whole energy stored in the so-called centrifugal force of the universe.

Further proof that the universe does not move without expenditure of energy will be expounded farther on.

Another principle which alone would remove perpetual motion from the domain of the impossible may be described thus: It is known that different gases compressed together ignore the presence of each other as to compression, i. e., if one kind of gas, for instance, is under pressure in a holder, another kind of gas may be introduced into that same holder and the presence of the first gas will have no effect upon the second, so that the holder may contain as much of the second gas for attaining a given pressure as if there were nothing in the holder, and the pressure of the first gas will not be changed by the introduction of the second. If these two gases are compressed each into a separate holder of equal size and at even pressure, it will take twice as much power to compress the two gases as to compress one into its holder, and the potential energy contained in the pressure of these two gases will be twice that contained in one, but if the contents of the two holders are put into one of them, the pressure will

remain the same and the potential energy shall have been cut in half thereby.

Or by a more handy method, if an open communication were established between the two holders, such as by means of a cock in a pipe connecting them, the pressure would drop to one-half, since the gas contained in each holder would expand into the other as if empty. If we had three or four holders with different gases the contained energy or pressure would drop to one-third or one-fourth on putting them into communication. Yet no gas would have escaped to the outside and no work would have been done. (What becomes of the famed "conservation of energy" in this case?) Now this effect may be inverted, in theory at least. It would take no more power to compress a mixture of several gases than to compress one, although the mass of gas compressed would be different and proportional to the number of gases in the mixture. This is another little trick of Nature which may escape the notice of the casual observer. What represents energy is the degree of pressure, and it makes no difference what amount of matter produces that pressure. Now if we suppose that each one of the gases in the mixture could be made to do work separately, either successively or simultaneously, in that event each gas

would turn out as much energy as was expended in compressing them all. Neither need it be said that the gases could not possibly be brought to act thus separately. For instance, the holder could be double walled, the inner wall being composed of a substance that would be porous enough to let one of the gases pass through it and not the other. Corrugations between the two walls would permit the first gas to reach an outlet, and after spending all the energy of this gas, that of the other would still remain intact.

Another illustration of the doubling of natural effects may be described as follows: If one gallon of coal oil is burnt in a lamp it shall have produced a certain amount of light and a certain amount of heat. As a rule the light only is utilized, but the heat could be transformed into light and the output of light thereby doubled. With gas, the use of mantles appears to produce another doubling effect, apparently due to incandescence. Many other examples of multiple effects from a single cause could be cited, such as that already pointed out, of the simultaneous generation of cold and potential energy, permitting to multiply energy indefinitely. The burning of fuel produces a chemical change in the matter involved, giving it different properties, and besides, this change

gives us heat, light and energy. It may be assumed that it is by some such analogous process that certain cells and other formations in animal economy are multiplied. So must be also the multiplication of seeds of all kinds. All of which goes to show that Nature is never at a loss to find abundant compensation for all her lavish expenditures, and that she is abundantly able to give "something for nothing."

Now for the doctrine of the conservation of energy. What is energy? As now defined, energy is said to be that which can do work. It is not said to be anything else. Then when the energy has been expended in doing the work it can do no more, but it is still energy; so that energy is something which can do work and something which can do no work at the same time. This is a nice riddle for a Sphinx. The expended energy is usually called "irreclaimable" or "unavailable," but what is the difference with inability to do work? There is none whatever.

It follows that in the foregoing definition, energy and the force of matter or temperature are considered as one, which they are not. Potential energy being the power of causing motion, the fact is that expended energy and expended motion are precisely the same

thing, i. e. they are nothing at all; both have gone out of existence at the same time.*

It must be remarked here that if we consider work and motion as identical, the useless as well as the useful work must be taken into account. If the useless work is not included, work and motion cease to be identical, for any amount of motion may take place without any useful work being done. By useless work is meant friction and similar resistances. Useless work is apparently molecular in form. If a given amount of energy is expended in raising a given weight to a given height, the bulk of the energy shall have been only transformed in form, or transferred. What really absorbs or expends energy is both useful and useless friction and the parting or crushing of solid matter. Energy expended in raising a weight is not really expended; it remains stored in the weight, minus that expended by friction, but no motion can take place without friction, and it is friction and the parting of solid matter that represents work.

It is the change in temperature which generates new energy. Difference in temperatures represents the energy generated and temperature is ever changeable,

*This requires qualification that will be given in the last part of this work, but that does not change the meaning intended here.

both by rise and fall, and no loss of force ever occurs in the changes which take place.

The virtue of changing temperature resides in matter itself and constitutes its force or one form of it, electro-magnetism being assumed to be another form.

That it is matter itself which possesses the power of changing its own temperature we see in fire; what else should possess the power but matter? And if matter has the power of raising its own temperature by combustion, why not that of lowering it by some other process? "It is a poor rule that does not work both ways."

In this case it would be not only a poor rule, but the possession of the one power by matter carries with it the absolute necessity of an equal and opposite power. Otherwise, by this time the whole of the matter forming the universe would be either diffused into its minutest particles throughout the infinitude of space or agglomerated in a single solid motionless mass which the so-called law of gravitation in the way it is at present expounded could not prevent, as will be shown hereinafter. The law of gravitation is universal, but it must be at the same time localized in each solar system and "Every particle of matter in the universe [does not] attract every other particle,"

but only those of the solar system to which it belongs, and the so-called centripetal and centrifugal forces are only effects, not causes.

We know with absolute certainty that matter possesses the first just cited power—that of raising its own temperature by combustion, which makes it expand and volatilize. It is therefore easy to prove that it **must** possess the opposite power, even if the fact were not otherwise proven.

HEAT IS TRANSFORMED COLD.

Since cold is transformed heat, heat must be transformed cold, and we will find that it is so, very clearly and indubitably so.

When fuel is burning, some heat is evolved which had no actual existence before the combustion; but if it had no existence as heat it had existence as something else. What was it? The heat cannot be born out of nothing. It is born out of cold which holds the molecules of the fuel together, but which by the chemical action of combustion is transformed into heat. The forces of Nature are not only correlated, but are

ever present in one form or another. Heat is present in the fuel in the form of cold.

And how did the fuel originate? Was not heat an indispensable element to its formation? And was not gaseous matter transformed into solid matter in the same formation? The potential heat contained in fuel came to be stored in it by a transformation of heat into cold; it cannot be otherwise, for how could heat come out of the fuel if heat had not been absorbed in its formation and transformed at the same time into cold, thereby permitting the formation of solid out of gaseous matter? When the molecules or atoms of matter are chemically combined in some certain ways as they are in fuel, they remain in the solid state at the normal temperature, but when they combine differently they may or may not pass in whole or in part to the gaseous state. It is not more than logical to assume that all common kinds of fuel are derived directly or indirectly from vegetable or animal remains, and no vegetable or animal species can grow without heat or electricity, probably both. (It is supposed here that electricity plays an all important part, principally in the growth of submarine organic life.) All sources of heat come directly or indirectly from the sun; there can be little doubt about that, although the

former natural heat of the earth may, and probably has, contributed largely to its store of fuel formations in the long past.

Heat is not immutable, since it can have a commencement in the burning of fuel, and simple common sense reasoning tells us that that which can have a commencement can have an end and vice versa; this is a self-evident proposition which shows further that either heat or cold can be transformed the one into the other. It may be assumed that combustion and vegetable growth are opposite chemical actions. The vegetable kingdom is therefore a vehicle for the attraction and transformation of heat. If this heat were not transformed by the absorption of the matter containing it, vegetable growth should elevate the temperature of the surrounding atmosphere, while it is well known that it is the opposite which takes place; but hitherto no particular significance seems to have been attached to this fact, although it is indeed very eloquent when the cause is understood.

The luxuriant vegetation of tropical countries keeps and attracts moisture and absorbs so much heat as to materially lower the average temperature. On the other hand, in large expanses of barren ground, such as the Sahara Desert, the air is kept hot and dry

because there is no vegetation to absorb and transform the heat. But Nature provides counterbalances to keep or restore her own equilibrium whenever and wherever it may have a tendency to be disturbed. We have seen before that it is not only vegetation that transforms heat into cold. The expansion of the air by the heat, which remains unabsorbed, itself transforms the heat into cold in proportion as it is supplied by the sun, either the expansion alone or in combination with the winds which are bound to follow the expansion and mix the hot with cold air. But for this provision of Nature a drought in one country might extend over the whole of the earth and annihilate life upon it. The sun's heat has to be transformed in proportion as it is supplied or the earth would become red hot.

At the present time it is held that void space is intensely cold—"the cold of interstellar space" or absolute zero. This is one more scientific absurdity based on the assumption that cold is nothing. Why, if void space were so intensely cold, any vacuum bulb should be almost instantly covered with frost and nothing could keep off the frost, such as happens with a vessel containing liquid air, for instance. We could then get permanent refrigeration in a very simple and

very cheap way; all that would be necessary being to get a vacuum vessel of any description. But in such event, all the earth, with all the atmosphere surrounding it, should be frozen solid, since the atmosphere is supposed to be surrounded by a vacuum, and we would not need any more refrigeration.

(Inasmuch as things do not happen that way, may be some would say that the cold is "latent" in a vacuum and nowhere else.) Heat and cold or else temperature being a property of matter, it is contained by matter and void space could have no temperature if there were any such thing as absolutely void space.

It takes matter to absorb heat or cold, and if the sun's heat were not transformed in proportion as it is received by the earth, there would be nobody to write this in these parts.

THERE IS NO INERT MATTER.

The very fact that the temperature of any and all kinds of matter or elements is variable is absolute proof that there is no "inert matter," since change of temperature is an effect produced in matter by matter itself; and this is independently of the millions of chemical actions and reactions which take place in

matter, which bear the same indisputable evidence. To call matter inert when it is capable of producing all the innumerable chemical and physical manifestations known and unknown, is nonsense.

All effects or phenomena are either physical or chemical in their nature, but chemistry is in some way at the base of them all, either near or remotely.

All physical and chemical effects are necessarily caused by motion of some kind somewhere, and there can be no motion without something to move. The motions producing the effects may be many and complex and in their complexity may cause many effects related with each other, but the primordial cause of any and all effects is motion. **And any and all motion can have only one of two causes, or three if you will—repulsion or attraction, or both**—molecular or atomic repulsion and attraction. This gives us chemistry and chemistry gives us the forces of Nature.

We know with certainty of three states of matter: the solid, liquid and gaseous states. Sir William Crookes discovered a fourth, the radiant state, and this should forcibly be inferred by reason if it had not been discovered.

There may be other still more attenuated or "spiritualized" states of matter as it were, but this we do

not know. We do know, however, that there is a limit of temperature within which matter may remain in the solid state, as there is one in which it can remain in the liquid state, and there must be one for the gaseous state also; possibly one for radiant matter and any other state or states as well. The different limits will vary with the different kinds of matter, but there is one for each state of each kind. This would seem to imply that some kinds of matter are more material than others, so to speak, but this may be due to a condition of association or combination which is not permanent. Furthermore, caloric temperature is not the only kind of temperature which may affect and change the different states of matter.

What might be termed "electric temperature" can do it also. Electric temperature is not caloric, or only weakly so.

Matter in the gaseous state is already invisible, transparent and intangible. Matter in the radiant state must be still more perfectly so, but in addition it is apparently imponderable, or rather "antiponderable;" that is, its particles have ceased to attract each other and are now repelling each other, only lack of available space preventing them from getting farther and farther apart, so that matter in this condition has

no weight, but has the opposite of weight; its property of attraction has been inverted or transformed to that of repulsion. (It is assumed here that radiant matter pervades all interstellar space.) In fact, without the existence of such a repulsive force to counteract and oppose that of what we call gravity, or means to create it, as by the burning of fuel, any and all motion would be an impossibility.

Matter in the gaseous state still retains density, but in passing from the solid or liquid into the gaseous condition so much attractive force is transformed into repulsive that a limited opposition to gravity is secured, giving us what we call energy, which as we have seen before, can be secured also by the inverse operation, that is, the passing of the gaseous into the liquid or solid state. Opposites in forces are the male and female elements constituting a working whole, which is the life of the universe.

Combustion is only one form of chemical action, and as all matter is capable of being acted upon chemically, there is evidently no inert matter, for how could any chemical action involving changes of properties take place if it were not for molecular or atomic repulsions or attractions? Matter which remains solid or liquid remains so in virtue of the attractive force con-

tained in its molecules or atoms for the time being and could not pass into any different chemical combination unless a stronger repulsive or attractive force comes into play, giving to the new combination properties that none of its elements possessed before.

But furthermore, matter evidently contains the vital principles of organic life which are equally based on chemistry, and which necessarily bear a relation with the natural forces.

Indeed we know very little about the properties of matter, and between what we call matter and spirit I venture to say there may not be so wide a gulch as is commonly imagined. It may be only a question of degree or condition where the atom or the minutest particle may disappear, but this, of course, is far beyond possible analysis, at the present time at least.

POLES OF TEMPERATURE.

If all matter had a unique and invariable temperature, no matter how low or high, what we call temperature would be unknown and unknowable, as there would be no poles to it and no difference could ever be felt or indicated. A man who should have lived all his life without ever feeling any difference in tem-

perature could not realize what temperature is any more than a blind born can realize what light is. Matter may possibly be endowed with some such unchangeable property or properties which we do not know, but only a revelation from a higher order of beings could make us aware of it. Assuming that temperature could exist in such condition, the same would not be a force since it could not generate energy as we understand it. Consequently one pole of any real force of nature cannot exist without an equal and opposite pole, for it is the existence of the one that makes the existence of the other, and the plain fact that we have any two different temperatures is the positive proof that heat and cold are its opposite poles which attract each other and return the one into the other until polarity ceases.

If there is an absolute zero of heat which is the maximum of cold there must be an absolute zero of cold which is the maximum of heat, and those would be the ultimate poles of temperature. Heat could not exist without cold or cold without heat. What more proof is wanting that heat and cold are the opposite poles of a single force?

For us the normal average temperature at the surface of the earth is the dividing point between heat

and cold. Any two different temperatures both above this normal, are poles of heat; if both below the normal, they are poles of cold. Red hot iron represents cold if we compare it to the heat of the sun, and ice represents heat if we compare it to the temperature of liquid air. Consequently any pole or degree of temperature may be a positive or negative pole, according to whether the other pole is a temperature above or below that one. A similar relation must exist between electricity and magnetism which is abundantly indicated by the evidence at hand. Furthermore, the very existence of electricity and magnetism, like that of heat and cold, are necessarily dependent upon such a relation.

The following, which is the end of a communication purporting to be from the beyond, and extracted from "The Encyclopedia of Death and Life in the Spirit World," by J. R. Francis, renders admirably some thoughts I had expressed in writing long before reading said article or anything of the kind:

* * * "I asked this fair one why it was necessary the sexes should be united after they had passed beyond the stage or sphere of procreation. What further use were they to each other as such? She an-

swered: Of what use are the two poles of a galvanic battery? Because they cannot exist separate, or are only in a quiescent state. The current can not flow unless the circuit is complete. Just so with mortals or spirits, beings of a higher order incomplete alone. The Bible says: 'It is not good for man (mankind) to be alone,' which holds good throughout the spheres. If this were not the law, spirits would mingle together promiscuously, seemingly without a purpose in an inharmonious manner. While, on the other hand, they are similar to a fond pair on earth; they have a special object to love and care for, which gives them an aspiration for a more exalted condition.

There will come a time in the unfoldment of the spirit when they will be so strongly united that they will have no desire to be separated. They will be virtually one, 'twain of one spirit,' as you have seen in a former vision.

This is in accordance with the universal law of the positive and negative forces of nature, which is the harmonizing principle throughout the universe.* In the earth sphere these seemingly two elements, as seen in the sexes, are noticeably distinct. They are

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*The [redacted] in bold type in this paragraph is mine.

separate and independent until attracted together by the common law of affinity, which is only partly understood."

This contains food for reflection, Messrs. the savants materialists; what do you think of it? I hear you say that it is all fake and humbug, as some scientists once said concerning mesmerism, when they first tried to look into it and could find no explanation. To-day they could no longer deny its successor, hypnotism, which they could not explain any better.

The doctrine of evolution is now established on a firm footing which is being constantly reinforced by further evidence, but it would be absurd to suppose that the zenith of evolution has been reached by mankind or even by the intellectually most eminent of the race. It is not even wise to assign any limit to the evolutionary process. Hypnotism, telepathy, mind reading, clairvoyance, and all the allied phenomena designated as occult sciences, which have hardly reached the embryonic stage, are in all likelihood steps in the ladder humanity has to climb. This leads us forcibly to merge the material into the spiritual, which are apparently linked by metamorphoses, one of which is called death.

But at present we are only concerned with what

man of to-day can understand—the physical laws of nature, as far as known, or within the scope of man's apprehension.

In any event, what is ridiculed by science is often what offers the greatest rewards for the investigating mind.

In the "American Inventor" of July 15, 1903, appears the following note, page 38: "The weight of a body increases as it grows colder, has been demonstrated by Professor Babcock of Wisconsin University. Professor Russell of the same university says of Professor Babcock's work: 'I believe his discovery to be fully as important as the Newtonian law of gravitation and even broader than the law of the conservation of energy. The exactitude and accuracy of his experiments so far, can not be questioned.' Professor Babcock perfected an apparatus for weighing and melting ice, and found that it lost weight in thawing. That is, a half ton of ice produced less than a half ton of water."

This is actually the first direct experimental, and absolute proof of what has been said herein concerning the nature of cold as a force. It means more than that however. It is the positive proof that cold is the very cause of weight or one of the causes, magnetism being assumed to be a complimentary factor, as ex-

pounded in the following pages, written long before this announcement was made as well as the preceding ones.

If cold increases weight, it does produce weight to the extent of the increase, and it means that increase of either cold or weight involves increase of the other or of both, and consequently that cold is at least one of the factors producing weight, gravity or gravitation in its entire manifestation, and that decrease of cold or increase of heat is at least one of the factors producing the opposite which is repulsion.

PART II.

FORCES OF MATTER. CELESTIAL MECHANISM.

I.

Many of the propositions hereinafter expounded are of a somewhat more speculative nature than those of the first part, but they would not be given at all if no good grounds had been found to warrant their mention with some degree of reserve, while many other statements should be found quite as convincing to unbiased minds as those of the first part. It is therefore not expected or implied that everything said should prove just right, but it is expected that some measure of new light will be thrown upon many speculations of the centuries. Those more able to do so may develop the lead if it agrees with their own views.

My conception of the causes and effects of the universal machine is as follows: The universe is maintained in motion and in equilibrium by the combined and opposite action of attractive and repulsive forces, through which action energy is everlastingly generated

to keep the motion. One attractive and one repulsive force is meant for what is really the positive and negative pole of a single force.

The suns or stars and the planets are bodies which on the whole may be considered as being formed of about the same constituent elements, although there may be considerable variations. The physical condition of the suns and that of the planets are diametrically opposite, representing what may be called male and female elements or conditions.

The same forces are present in both conditions, but in an inverted way, i. e., suns are hot at the surface and cold at the center, the heat increasing gradually from the center to the surface; while planets are getting colder and colder from the center to the surface.

The principal if not the only forces are: temperature, whose poles are heat and cold; and electro-magnetism, whose poles are electricity and magnetism; electricity being transformed magnetism and magnetism transformed electricity. Heat and electricity are the repulsive forces, while cold and magnetism are the attractive forces. All other so-called forces are only effects of these which are based on chemistry, or the property of the elements of combining together in

many different ways, and of disintegrating from said combinations to enter into new ones. From these chemical actions physical actions are induced, one of which is life. The universe is an unbounded laboratory and all its life and motion are derived from chemistry.

The so-called force of gravitation, gravity or centripetal force is therefore an effect of the combined attractive forces of cold and magnetism, while the so-called centrifugal force or momentum is produced or maintained by the repulsive forces of heat and electricity. Electricity is assumed to be produced by a form or forms of combustion different from caloric combustion, but like the latter, is a repulsive force; all forms of combustion being chemical actions.

The suns are bodies which are burning up at the surface, the combustion being both caloric and electric, and the products of combustion fill the interstellar space with radiant matter which is absorbed by the planets. Space being saturated with this radiant matter, composed of all kinds of elements, the combustion of the suns cannot proceed faster than the absorption of the radiant matter by the planets.

This radiant matter is what really fills the place of the mythical ether, each one of the different elements

giving the different wave length observed in spectroscopy, and each element ignoring the presence of the others in the same way that two or more gases compressed together ignore the presence of each other. It is the repellent force of this radiant matter which prevents the planets from falling into their respective sun, so that the planets float into it, but are at the same time attracted by the internal unconsumed mass of their respective sun which keeps them at a determined distance inversely proportional to their density.

This is the reason why the waves of radiant matter, now called ether waves, seem to travel athwart at the surface of the earth, said waves being strongly deflected or flattened as they meet the earth, this causes them to spread tangentially.

Suns are repelling each other through the radiant matter they emit and through that already pervading space, in consequence of which they move in all directions where resistance is least with regard to each of them; i. e., each sun moves in the direction of space where the pressure of radiant matter is least in its own proximity. The radiant matter itself tends to keep an equilibrium of pressure throughout space and moves toward the points of least pressure or what

might be called partial vacuum, as can be exemplified by the motions of the atmosphere, and what might be termed wind currents, for want of a better name, are probably a feature of radiant matter throughout infinity. Such currents might account for the existence of the Milky Way.

The radiant matter is moving circularly with each star, but not in a body like a solid mass.

The speed of circular motion of radiant matter decreases with the distance from the star by which it is emitted and with which it revolves.

This accounts for the third law of Kepler concerning the speed of orbital motion of the planets. To the repulsive force of radiant matter combined with the attractive force of tangible matter is due all the regular motions of all celestial bodies. The repulsive force keeping the planets at a determined distance from their respective sun is balanced by the attractive force of the planets upon the unconsumed mass of their sun, but there is no such compensation between stars.

Each star being a focus of radiant matter, the encounter of radiant matter emanating from different focuses produces eddies, currents and spirals, principally spirals, whose center is the focus, and these spirals act upon each other as spur or cog-wheels, to

give an illustration, and this imparts an axial rotation to the stars; but as the repulsive force of radiant matter decreases with the distance from its focus in consequence of being more rarefied it follows that its motion is correspondingly less the greater the distance, and the average distances between focuses is so vast that at the greater distances the motion of radiant matter around its focus is almost nill; yet in proportion as the distance from the focus decreases, the pressure is increased, until at the surface of the star the repulsive force and pressure are such as to impart a tremendous speed of rotation to the focus or star. Then the radiant matter has to glide upon itself continually throughout space, changing the relative positions of its particles.

For illustration we may suppose that the radiant matter is divided into any number of layers winding successively and spirally upon each other and that each convolution of the spiral moves with a different speed which increases as the pressure and inversely as the distance from the focus, the latter moving fastest upon its axis, while the outer convolutions of the spiral are almost stationary relatively to the rotary motion of the focus.

Another more or less appropriate illustration of the gliding of the particles of radiant matter upon them-

selves whereby their circular motion decreases in speed as the distance from the focus increases, would be a comparison of the motion of the water of the sea which when violently agitated moves fast at the surface, yet remains quiet a short distance below.

It is not necessarily essential, however, that radiant matter should fill all interstellar space or that the radiant matter from one focus should extend until it meets the radiant matter from other focuses. The attraction of gravitation takes place at a distance, and the repulsive action may and must take place also at a distance anyway as will be shown subsequently.

The particles of radiant matter not only repel each other through their repulsive influence, be that what it may, without touching each other, but they at the same time repel condensed matter or matter in bulk, so that the repulsive force acting upon a planet is proportional to its surface exposed to the repulsive action; the repulsive intensity decreasing with the distance in a proportion to be determined, the density of the planets determines their distance from the sun; said distance increasing inversely as the density.

The energy producing the rotary motion of a sun upon its axis is therefore generated by the combustion of that sun itself, while some radiant matter being

constantly absorbed by its planets permits the combustion to proceed only as fast as radiant matter is absorbed and would stop with the stoppage of the absorption. Of course the repulsive action must proceed from the focus; the action of the radiant matter on the focus being merely one of pressure and relative inertia.

Inasmuch as the radiant matter is composed of all kinds of elements whose wave lengths vary enormously, it may be assumed that they form independent spirals of different curvature and different length.

The planets absorb radiant matter through the vegetable and animal kingdoms and probably in many other ways. Indeed, there are good reasons for assuming that all the earth formations are growing like plants and trees, but much more slowly, from the absorption of radiant matter. There can be little doubt that coral reefs are growing. These are feeding upon the small animals called corals and are not built up by them since the structure of these animals disappears in the coral formations. The seams and layers found in all rocky and other earth formations remind one of the successive layers of tree trunks, and can be explained only, on the assumption of secular growth. It is said to have been discovered that diamonds are

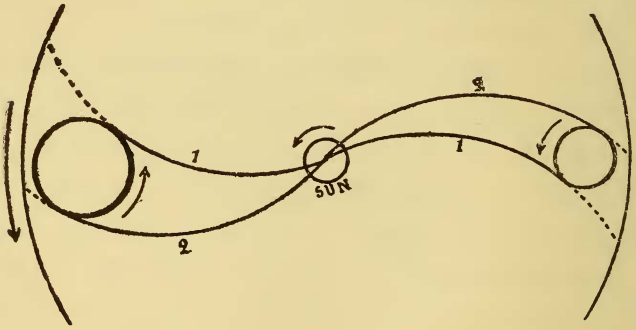
alive, and they must be at least before cutting. In working over gold mines after a lapse of years, miners are often astonished at the amount of gold left in former workings; so much so that the theory has been advanced before that gold grows. No doubt it does, but the sun provides the substance. The planets are thus storing materials with which to aliment future suns, while the present suns will in turn become planets after consuming all their substance, minus a residuum of ashes, to act as nucleus for the condensation of surrounding gases and vapors and the formation of new planets, and so on forever.

According to the foregoing hypothesis of the motion of radiant matter, the waves of light and all kinds of rays, which are assumed to be produced by the various elements composing the radiant matter, would travel not in a straight line, but in spiral form, and as a consequence the distance of the stars would be immensely less than is supposed, for the line of vision and of light waves would follow the spiral.

For the same reason, the distance of the sun in a straight line would be a great deal less than it is said to be.

The spiral form of motion of the radiant matter would give rise to the axial rotation of the planets in

the same direction as that of the sun, for the solar rays reaching each planet would be of inequal length, the outer rays of the spiral, i. e., those exterior to the curve of the radius vector, or bundle of rays whose path is interrupted by a planet, being longer than the inner ones, and the repulsive force of the shorter rays stronger than that of the longer ones, would account for the axial rotation, as shown in the diagram below, the dots at the end of the lines 1, 2, indicating their difference of length.



The difference between the longest and the shortest rays of the spiral reaching on any planet would be so much greater that the planet itself would be greater, and as a consequence the bigger the planet would be the faster would it turn upon its axis. Here a very

important remark must be made bearing directly on this latter proposition.

The earth, Mars and Jupiter, are about the only planets whose diameter and principally the duration of axial rotation are known with anything approaching more or less certainty and accuracy.

Then they precisely seem to bear with each other a relation of the kind just described. While the length of the day on Mars exceeds somewhat that of the earth, that of Jupiter is a great deal shorter, and their respective diameters are found to have a very nearly equal relation. Thus, if the difference between the length of day on Mars and the earth is divided by the difference between that of Mars and Jupiter, and the same division and comparison made between their respective diameters there will be found the analogy. The coincidence is not perfect from the data at hand, but the discrepancy may be accounted for from various possible causes, the principal being that the atmosphere of the three planets has to be taken into account and that its depth on any of them is unknown, principally that of Jupiter, and it is also unknown what hold or lack of it the atmospheres would offer to the radiant matter. This lack of knowledge concerning the atmosphere of the planets alone con-

tains ample margin to get perfect concordance within acceptable limits of probability as to the extent of the atmospheres.

Inasmuch as the repulsive energy of radiant matter decreases with the distance from the sun, the distance of the planets from the sun is inversely proportional to their density, and the energy required to keep their axial rotation is also inversely proportional to their density or distance from the sun, so that this distance from the sun has no influence on the speed of their axial rotation.

The spiral curvature of motion of radiant matter may possibly commence only at a great distance from the sun, so that the radiant matter would turn in a body with the sun up to that distance. In this event any planet located within that distance would have no axial rotation, since its forward and backward radius vector being straight would be of equal length.

It is assumed that the solar rays reflected by both the planets and their satellites act indirectly upon the satellites as they act directly upon the planets, and that it is these reflected rays which in part at least prevent the satellites from falling onto the planets. The rays reflected by the planets would also impart the orbital motion to their satellites.

This explanation may not be entirely satisfactory, but there is another one with which we may familiarize ourselves when we have fully realized that both repulsion and attraction must take place at a distance. All the indications are that the interior of the earth is intensely hot and this heat represents a repulsive force, but as it is so situated that its repulsive action is prevented from expanding the earth matter by the exterior forces of cold, this internal heat may act at a distance to keep the moon away. In this connection electricity and magnetism have not been mentioned, but it is understood that they act conjointly with heat and cold.

On account of the relatively small size and distance of the satellites from their respective planet and the relatively small speed of axial rotation of the small planets, the satellites would fail to turn upon their axis, as happens with the moon; the reason being first that the solar rays reflected by the earth or the repulsive rays from the earth itself reach the moon in practically straight lines; so that rays reaching any two points equidistant from the center of the visible moon's surface are of equal length and consequently of equal repulsive force; and secondly, even if these rays were slightly curved, the moon is so small that

the difference in length of the rays reaching it from the earth or even from the sun would be insufficient to make it turn upon its axis; while a slightly higher density or magnetic attraction on one side of the moon would make it present always that side to the earth.

The radiant matter on meeting the earth would be in part reflected into space and in part would pass round the earth to meet again on the opposite side, but at a distance from the earth, and its encounter with the earth would give us the zodiacal light, while the shock of its meeting again, after passing round the earth, at a point of space opposite to the sun would produce the faint glow known as the Gegenschein. The side of the earth opposite to the sun would therefore be the base of a cone having a partial vacuum of radiant matter, or rather that part of it shielded by the earth would be in a quiescent state.

If it were not so there should be no night, as the sun would remain always visible, as happens in some parts of the earth adjacent to the polar zones where the midnight sun is seen, although far below the horizon. That is because such parts lie in the path traversed by sun rays round the earth before they leave it to be reunited in the Gegenschein, leaving the cone of shadow whose apex is the said Gegenschein.

The motion of the earth upon its axis would be the cause of the zodiacal light occurring only in tropical latitudes on account of the higher speed of motion at the equator.

Another possible cause would be the non-absorption in these latitudes of radiant matter of an electrical nature, on account of the hot air preventing its passage through it, but which would be absorbed more readily in colder latitudes, while the absorption of caloric radiant matter would be most pronounced at the equatorial regions. While both hypotheses may be true in part, the former is considered more likely.

The motion of the earth upon its axis may or should have a tendency to make the eastern stream or current of radiant matter more prominent than the western. This is a fact fully confirmed by the recorded observation of zodiacal light.

Auroras borealis must be unusual agglomerations or clouds of radiant matter denser than its average density next to the earth and expelled from the sun with unusual violence in solar eruptions, such clouds hovering towards the poles where the agitation of radiant matter is least, until gradually absorbed by the earth.

I have long suspected that the great streamers ob-

served in the solar corona in eclipses of the sun are caused by the draft upon the radiant matter, due to its absorption by the planets, but have no means to test this hypothesis. If correct, the streamers should be found directed toward the planets and none should ever be seen at the sun's poles.

The orbits of all the planets being more or less close to the plane of the ecliptic would naturally render accurate determinations difficult. In any event, the appearance of the sun as resulting from all the observations bears unmistakable evidence that it is a body in combustion.

Sun spots must consist simply of solid or liquid matter ejected from its interior in eruptions and which gradually melt away, thereby supplying new material to feed the fire. That is precisely what the appearance of the spots indicate; their appearance would vary according to the kinds of material ejected. Very inflammable material, such as a gas or liquid, would flash up and disappear, while other, solids, and not so inflammable, would melt first in the ocean of melted matter preceding the vaporous atmosphere of the sun, and on melting would gradually disappear also. The formation as well as the disappearance of the spots is said to be gradual. That is because the eruptions

which give them birth continue for some time after a vent has been made and until the internal pressure has been relieved to the point of equaling the external pressure, when the eruption stops. Therefore, the eruptions must be started by the pressure of gases or vapors lying below the solid surface of the sun, such as would occur on the earth if its surface were ablaze.

This is probably what is to be its fate in the very, very remote future, when its physical conditions shall have been brought to a state of maturity for such occurrence; but many geological ages will elapse before the dust of our bodies shall be again turned into radiant matter, through which condition it must have passed already millions of times.

II.

In order to analyze any substance by spectroscopy, the substance has to be held in a flame or electric spark. There is no necessity for an imaginary ether to play any part in the phenomenon evolved here. It is produced simply by a very minute part of the substance passing to the radiant state on account of the heat imparted to it. If held long enough in the flame

it would all pass to the radiant state, but it might require many years with a flame of relatively low temperature. It has been found, however, that almost all substances disappear very rapidly in the electric furnace. What becomes of them? Is not this a demonstration that matter passes to the radiant state? Is it found in the gaseous state after disappearance? And if radiant matter exist at all, how is it brought to this state? Of course the matter brought to the radiant state in the electric furnace may be cooled again and absorbed in the earth, and no doubt it is, but how about that emitted by the sun? Since by spectral analysis many of the elements present on the earth are found to be present in the sun also, it can be inferred that their presence in the sun can be detected solely by their passing to the radiant state, through either or both caloric and electric combustion of the sun.

Why should the elements forming the sun reveal their presence in it indirectly through such a strange medium as an "ether" instead of directly through themselves? What disposition would scientists make of all the radiant matter turned loose during all the millions of years the combustion of the sun has been in progress when the sun is only one of the millions

of stars which have been emitting radiant matter for countless ages? What necessity is there for an impossible ether to take the place of the radiant matter when the latter requires so much room for itself? Is there any way known to science of producing permanent luminosity and heat unless combustion of some kind is taking place somewhere? And can combustion take place unless something is consumed? From the observations and appearance of the sun is it not clear that it is a body in combustion? These are vital questions, and unless they can be rationally negatived, our planet must be floating in radiant matter and the same is present throughout Infinity. The theory of **free** condensation producing heat is rather funny to say the least, since in our experience heat invariably produces expansion, and although **forced** condensation, i. e., compression, will produce heat, power has to be expended in effecting the compression, and any heat produced by free condensation would immediately stop that condensation, since the state of expansion of the matter would be due to the heat (or electricity) it contains, and any addition to that heat would expand the matter further instead of permitting it to condense. Free condensation destroys heat instead of creating any.

It seems likely that the matter consumed is transformed into radiant matter where the atoms are split into many thousand parts and the time required to consume a given mass is correspondingly larger than in caloric combustion, which is of a grosser nature where the elements involved do not pass beyond the gaseous state. Since in caloric combustion the elements involved do not pass beyond the gaseous state as far as known, if the existence of radiant matter is once admitted and proven, that fact alone would constitute strong evidence in support of the electrical combustion theory as just described, for the radiant state of matter is a natural state, and there is probably more matter in this state than in all the others combined, unless ponderable and imponderable matter equal each other in amount as the counterpart of each other, which is not unreasonable supposition. Very intense heat may probably reduce some if not all kinds of ponderable matter to the radiant state also, but that would not be as a result of its own combustion, and it does not appear that the physical conditions or state of the sun and stars are such as to permit of their being consumed by caloric combustion, since in the latter the matter involved in the combustion does not pass beyond the gaseous state, and this state can

hardly be imagined as existing in the vicinity of the sun except under a tremendous pressure; but furthermore the final act completing the combustion of the solar matter by either caloric or electric combustion may be considered as taking place on the planets, if as advanced and most likely, it is their absorption of radiant matter which permits the sun to burn.

III.

One may wonder that the repulsive and attractive forces moving the universe are on the whole balanced to such a nicety, principally in view of the fact that the solar activity is variable. But from that it does not follow that the repulsive intensity of the radiant matter emitted by it should vary accordingly. Laplace is credited with saying that the length of the year has not changed by as much as a second in thousands of years. This is a singularly sweeping and hazarded assertion based upon erroneous apprehension of the real state of things. The fact is that we have positively no way of ascertaining what was the length of the year or day one thousand years ago. It might

have been one-half of what it is in our time or twice as long for all we know.

And what is more, we have positively no known way so far of transmitting to posterity any intelligence of what is the exact length of our year or day. There may be a certain exact number of seconds in a year, but the seconds may be longer or shorter and we would have no way of knowing it.

We divide the day into 24 parts, but if it were twice as long it could be divided into 24 parts as well, and each part divided into 60, and so forth.

Our time pieces are all operated by the forces of Nature and follow in their action the increasing or decreasing intensity of said forces on our planet and the central orb. Even changes in temperature and no doubt in electro-magnetism have a disturbing influence upon them. They are adjusted by hand to divide the day into a certain number of parts, no matter what the average length of the day may be. It does not appear that possible differences in the average length of the day of one year as compared with that of another year has ever been taken into consideration, and in this regard all that could be done would be only guess work at best, principally in view of the fact that the difference could be only very minute anyway.

The ancient means of recording time could not offer any more accuracy; so that we have not even any way of knowing if two successive years are exactly of the same length. There is apparently nothing permanently stable upon which to base an exact computation of time for all time to come. Assuming that the mass and volume of the earth is increasing, the oscillations of the pendulum would be accelerated in proportion and the length of day shortened accordingly, while the number of oscillations in a given time as recorded, would remain the same, but the real time would be different. In the years of greater solar activity the planets might be shifted further away from the sun, but they would move on in their orbits with correspondingly increased speed and our clocks would not detect the fact. While it is not likely that the average length of the year changes appreciably unless in very long periods of time, this cannot be taken as a base of absolute stability to establish or disprove other facts.

IV.

Another weighty proof of the repulsive action emanating from the sun is to be found in comet tails which

remain opposite to the sun at any point of the comet's course. Comets are apparently composed mainly of gases or more or less condensed radiant matter of various kinds, varying in kind and proportions with different comets. These agglomerations of condensed radiant matter or gases are the more expanded by the solar heat and electricity the more the comet approaches the sun, and as it expands, the attractive force of the comet nucleus becomes less than the repulsive force emanating from the sun, so that it is blasted behind the comet and we behold it in the tail. The lighter matter is expelled first, but the heavier matter, which is not so easily expelled, is expanded also until the volume of the comet is increased to such an extent without increase of mass that the tremendous momentum of the comet is finally overcome by the ever-increasing repulsive action of the sun as the comet comes nearer, after which the comet is lanced back into space away from the sun by this repulsive force with a speed proportional to that of its coming, so that no comet can fall into the sun.

Or if the matter of the comet itself is not expelled it is put into violent vibration, whirling or eddying, which is transmitted to the radiant matter of space, and the unusual perturbation of the latter renders it

visible in the tail. Which of these two hypotheses is the more likely is not easy to tell, but either points to the existence of radiant matter in space, for what we can see must consist of something and something material. As regards the first hypothesis we cannot easily conceive of matter traversing hundreds of thousands of miles almost in a twinkling, as that in the tail of some comets would have to traverse for the tail to remain always opposite the sun, but radiant matter cannot be subject to the limitations of tangible matter as regards the time required to traverse a given space. Science is altogether unfamiliar with the radiant state of matter in which its properties are apparently inverted and we should not be too hasty in reaching conclusions. In fact, what is the most probable is that the matter expelled from the comet does not traverse the whole length of the tail, but on being pushed back, it itself pushes back the radiant matter of space of the same kind and takes its place in the same way that the water of an impetuous stream on reaching the sea does not traverse the whole distance covered by the perceptible disturbance produced by it on the water of the sea.

In any event, the spreading of the nebulosity around the new star in Perseus and the motion of certain

patches in it, which has been found to occur with a speed which may approach if not equal that of light gives us an illustration of the speed of motion of radiant matter. This nebulosity around Nova Persei will disappear completely when the radiant matter of which it is composed shall have reached its normal state of equilibrium around the new star.

The sudden appearance of this and of all other new stars is generally attributed to a collision of some kind between dark bodies, but while collisions may be one way to end a world and cause its re-birth, it is an unnatural way in that it is in the form of an accident, and there must be some other way in Nature for accomplishing the same end normally.

We may suppose, for instance, that when a planet has lived long enough the planet life, its atmosphere has accumulated elements which make it inflammable, electrically or otherwise.

A sideral match in the form of a meteorite falling on the planet or the spark of thunder would start the conflagration. The cold at the surface of the planet being thereby transformed into heat, the internal heat of the planet might cause an explosion of the whole planet which would transform the internal heat into cold, and the birth of a new star would be an accom-

plished fact. The absence of a vivifying sun or the passage of a planet through a vacuum of radiant matter might also cause its explosion, which would fill the vacuum.

It looks as if the curvature of comet tails were varying with the speed at which comets move toward and away from the sun, the curvature decreasing with the speed. This could be accounted for from the spiral motion of the radiant matter of space. The matter ejected from the comet being too light to remain in the medium surrounding it, said matter would naturally follow the shortest path to get out of a sphere that does not belong to it; yet if the comet were motionless this would give time to the matter ejected from it to be carried more or less in the direction of the motion of the matter of space, but the comet itself being in rapid motion, the repulsive action imparted to it is instantly transmitted behind in a line which is the more nearly straight as the motion of the comet is the fastest.

Comets alone would disprove the accuracy of the law of gravitation as it is expounded, for they must be governed by the same laws which govern the motions of the planets, yet many of them which come from and go back into the Infinite, never to return,

pass quite close to the sun without falling into it. What is the force which prevents their fall after answering the sun's call from afar if it does not emanate from the sun itself?

And besides what would make them go away never to return after coming so near the sun?

These wanderers which have ever been puzzling astronomers are yet the bearers of important revelations.

It may be assumed that the cause of the elliptical form of orbit of the planets is the same as that of the parabolic form of orbit of the periodic comets, both being due to more or less oscillation between the attractive and repulsive forces. This would imply that the atmosphere of the planets may offer some degree of hold to the repulsive action of radiant matter. The latter assumption is borne out further by the phenomena observed in wireless telegraphy, which is effected simply through impulses imparted to the radiant matter of space with so much more efficiency as they are imparted at a higher elevation, and most electrical phenomena indicate the same thing.

The alternate increase and decrease in volume of the planets' atmospheres would cause their variation of distance from the sun, while the atmosphere of

comets being immensely larger than that of planets, their oscillation in distance is correspondingly larger.

It is likely, however, that the interference offered by the atmosphere of the earth to the impulses of radiant matter in wireless telegraphy does not extend to all kinds of it or not to the same extent for all kinds. The matter with the longest waves should prove to be the least interfered with and the one transmitting the impulses to the greatest distances, which might extend as far as a planet. I suggest to try to create the impulses by holding and withdrawing alternately any one of the elements in an electric flame or furnace, and testing all the elements in the same way.

V.

It follows from the foregoing that light would be produced by the wave motion of radiant matter, and said motion produced by combustion of some kind somewhere, while a shield of solid, opaque matter would stop the transmission of undulation of the light-giving elements of the radiant matter, thereby producing shadows.

Light is of two kinds, one being produced by caloric and the other by electric combustion, and they probably impart a wave motion to different elements of

the radiant matter. Electricity is apparently produced by a whirling motion of the same radiant matter. Stop this whirling motion and it will be transformed into waves or other forms of motion giving us light or heat or both.

Visible bodies are necessarily concerned in the effect of illumination and consequently in the production of light itself, i. e. the conjoint action of radiant and of tangible matter is what produces light; neither radiant nor tangible matter could produce light by itself alone unless coming into collision with itself. Of course, what has no existence cannot be visible, but all tangible matter having existence in itself plays a part in its visibility, in its color and in light, though dull black is negative to the light effect, because it absorbs all kinds of radiant matter and therefore all kinds of light, or rather does not lend itself to produce the latter on account of this absorption.

Whether the apparent differences in kind of matter, giving us different colors, is a real difference in kind or the effect of a difference in speed or amplitude of motion, or to a difference of division of the particles or to any other cause need not be discussed here. The apparent difference exists and there is a cause for it, but we know not what it is. For the present it may be

assumed that the apparent differences in kind is real since it produces real effects anyway. As to what matter is, we know it is the thing that moves, that is all; it is the lever, the fulcrum, and the whole universal self-acting machine in all its manifold and multitudinous functions.

VI.

"Every particle of matter in the universe attracts every other particle with a force varying directly as the masses, and inversely as the square of the distances."

"Every body continues in its state of rest, or of uniform motion in a straight line, except in so far as it is compelled by force to change that state."

When the latter of these two laws is considered in relation with the motive of the universe, the two are precisely the negation of each other.

If every particle of matter in the universe attracts every other particle, such attraction represents a force acting ceaselessly, and there could be no such thing as a state of uniform motion of matter without this force acting ceaselessly upon it, and the same force would bring about rest if not opposed. The sole virtue of attraction alone would be to produce motion until

all the matter forming the universe had united in a single mass, after which further motion would stop.

Attraction is produced by real forces, and unless there is some other real force opposite to that of attraction, the uniting of all matter in a single mass would necessarily and inevitably follow.

On the other hand, if there was a permanent state of rest of matter separated in different bodies away from each other, attraction would have stopped or should not exist, otherwise they could not stay at rest until united; so that attraction acting alone as an effect of force would not permit matter to remain in a permanent state of motion, and a permanent state of rest of divided matter could not exist in the divided state with the forces producing attraction acting alone upon it.

Now it is necessary to distinguish between a real force and an effect of force. Motion for instance is an effect of force but is not a force in itself. The same may be said of the so-called centrifugal force or momentum. It requires expenditure of energy to produce it, and the effect acts only upon the mass of matter to which it is imparted for a limited space of time, i. e., the effect can be created and destroyed and consequently can have a commencement and an end. At-

traction, however, is manifestly a permanent property of matter which cannot be destroyed (except by inversion) whatever the force or forces producing it may be. Consequently centrifugal force is utterly unable to be the counterpart of attraction except in a limited sense, and there must be some real force to produce and maintain it. But even if for the sake of argument we assume that centrifugal force is in itself the counterpart of the forces producing attraction, we will see that their united and opposite action would absolutely fail to account for the permanent motion of the universe.

It is admitted and well proven that there is mutual attraction between all the bodies of the solar system; this is not open to question, but that there is the same attraction between the sun and the stars is another question; the hvpothesis is purely speculative and there is not the least proof or indication of its accuracy, but rather the opposite. As it does not appear that all the stars are moving around one common center with orbits successively larger and larger, their mutual attraction should start a motion of the many distinct solar systems toward each other which could not be prevented by a centrifugal force originally imparted once for all to each individual member of each sys-

tem, as this centrifugal force would have reference only to one system and not to all. These solar systems getting closer and closer would finally bring the universe to a heap of ruins. Besides what would prevent the planets of any solar system from gradually getting nearer to each other until they had combined their mass, momentum and distance from their sun, since they exert disturbing influences upon each other in their movements? The effect of such disturbances would be permanent if nothing prevented it. That is, the orbits of the planets would gradually equalize, the smaller orbits being increased and the larger diminished, and the inevitable would necessarily follow. With mutual attraction they would not follow indefinitely the same path without uniting in one single mass.

Even if all the stars were moving around one common center on orbits successively larger for each successive star, or disposed in any number of groups or systems moving around one common center, there would be nothing to prevent this same amalgamation of their elements of motion. Groups of bodies would combine in a single body, then groups of larger bodies would be formed which would combine again, and so forth, until unity was reached.

The physical state of the sun is different from that of the planets and its action upon the planets must be different from that of a planet upon another; its action upon another star must also be different from its action upon a planet.

The natural opposite of attraction is repulsion, and since "for every action there is an equal and opposite reaction," why then has repulsion been left out and something else substituted for explaining the mechanism of the heavens, which has not been explained at all thereby? And why is heat ignored in the same explanation, since we know it to diffuse matter and is therefore a repulsive force? Why should heat generate energy creating motion in our hands and remain impotent for the same purpose in Nature? What we can do with the forces of Nature by artificial means on a small scale can be but an imitation of what such forces are doing in their own way on a grand scale. Man has to disturb some minute fraction of said forces from their channels to make them serve his purposes. Heat being evidently a repulsive force, since it diffuses matter, the opposite of heat is cold, and cold is necessarily a force of attraction. Then here is in part the cause of gravitation. Cold as well as heat being contained in matter, when heat is transformed into cold

there must be condensation of matter and therefore absorption.

There can be no motion of celestial bodies without expenditure of energy as in Newton's theory because there can be no motion which would not meet with the resistance of attraction or its derivatives and the sun would be spending its heat energy without producing any effect upon its own motion or that of the planets, and while this energy would go to waste we find nothing to answer the same purpose, so that the only real forces of Nature would have nothing to do with the motion of the universe.

If celestial bodies require an expenditure of energy to keep them in motion, the forces of Nature must necessarily be constantly passing from one form into another without becoming unavaiable for generating energy, or the world as a whole would come to a stop sooner or later.

Is there any indication that it will ever do so? Such an assumption is opposed to sound reasoning, as far as natural causes are concerned, but that would be the inevitable consequence by the accepted theories. Even if the world could move without expenditure of energy the original starting of the motion would remain to be explained, since attraction alone could not

account for it. The notion of a world's creation at some period of time and future end at some other period may be at the base of accepted theories, but we must find in Nature itself all the causes and effects we perceive and it will always furnish the explanation if we look for it in the right direction.

VII.

It does not appear that geologists have ever attempted to give us a logical explanation of how all the geological strata forming the earth crust have come to be formed from bottom up and where the materials to form them that way came from. All the imaginable upsettings of the earth crust could never account for them, and there has been no such upsetting to any very great extent but principally setting down. If the successive formation of geological strata had taken place from the surface down, as the admitted theory of the formation of the earth crust would lead one to suppose they should have done, then the material to form them would have been in the earth itself, but that is not the case. If they had been formed only by successive leveling of materials at different alti-

tudes, the same materials would have been worked over and over again without ever increasing the mass forming the upper layers of the crust. Geological data is hardly of a nature to confirm this condition. There is ample evidence of the secular increment of the earth crust as a whole even within the time covering the known history of man. The ruins of ancient cities and monuments are about all found deep below the surface of the ground, while implements of primitive man are often found a great deal deeper. The disappearance below the surface of things that once existed in ancient times at the surface seems to be general. It will not be difficult to find many other indications that the greater part of the earth crust is of cosmical origin, apart from its accessions of falling bodies, most of which are gaseous.

There are abundant evidences that certain regions of the earth now in the temperate zones have repeatedly been lying in the polar zones and that the present polar zones have been considerably warmer in times long gone by.

Hitherto no truly satisfactory explanation has been found for this fact. But if we assume that through the tropical vegetation radiant matter is absorbed faster than in the colder latitudes, this would tend to alter

the form of the earth and could easily account for the secular displacement of the continents, oceans and earth zones; so that in time all the points on the earth surface could have successively passed through all latitudes. The earth at the equator is not round but elliptic. Now this is precisely as it should be if circular belts of matter accumulate successively round its center at an angle to each other.

Such belts being formed at an angle to each other around the center of the earth would have to cross each other at two points, forming two prominences. These prominences would increase in size with the number of belts crossing at the same points; but too great an increase in the size of the prominences would cause them to be shifted aside by the force impelling the earth to turn round an axis and subsequent belts would not cross at the same points. The unequal absorption of matter round the earth is here compared to belts for convenience of illustration.

The solid materials of the earth crust being heavier than water, the accumulation of such materials on the continents would cause them to sink gradually, while areas covered by water would gradually rise, thereby producing the secular displacement of surfaces covered and uncovered by water. Evidences of former subma-

rine life in all parts of the continents, even at great altitudes, can be accounted for only in this way.

It may fairly be assumed that the present average temperature and conditions of life at the surface of the earth are not what they have been in former times, but each geological epoch produced animal and vegetable forms and species whose organism was adapted to the conditions then prevailing. Species now extinct could not live in our day nor could those of our day have lived at a very remote period of time without gradual adaptation to the different conditions in either case; hence the evolutionary process is primarily produced by a change of conditions, and as change of conditions goes on so does evolution.

VIII.

The fact that it is only the surface of bodies in space and the space surrounding them up to a certain distance that are illuminated by sunlight while the space at large is not, is a conclusive proof that the bodies themselves play a part in the effect of illumination. This part is clearly that of arresting the sun rays, whatever they may be composed of, and from this

stoppage results a peculiar motion which produces the effect of light. This would remain true if light were propagated through the medium of ether instead of radiant matter.

The result of the stoppage is a continuous series of shocks or pulsations which produce transverse waves and the waves produce the light.

This wave motion of the radiant matter is imparted at the surface of bodies by the impact of radiant matter against them and does not take place in space at large; that is why space at large is not luminous. The white foam produced by water rushing against a cliff is at once an illustration and an imitation of what takes place with the radiant matter in producing light. For that reason, a lamp reflector, for instance, does not merely reflect the light, but actually multiplies the amount of it, principally a silvered glass reflector, and this can be easily demonstrated. Have a light of a given candle power in the center of a room covered all around with black draperies, and have the same light in the same room covered all around with mirrors and see the difference in the intensity of the light. In the first case we will see little more than the burning light with a dim glow, while in the second the room will be brightly illuminated; a great deal more so than it

would be in the ordinary conditions of a room with the same light.

If the earth had no atmosphere and its whole surface were covered with lamp black, it would be about invisible in space and its side turned toward the sun would remain in darkness almost if not quite as much as the opposite. This at least is what must be inferred from the known behavior of light. Since all bodies in equal conditions for illumination are not equally bright, their brightness or lack of it is necessarily due to their own nature or condition which is accountable for the light effect or lack of it; and here again it is necessarily a case of attraction and absorption or of repulsion of something, and the "ether" can have nothing to do with it, for ether waves should act the same way on all bodies and would produce no difference in colors or degree of brightness. The repulsive action or stoppage is what produces the light or the foam of radiant matter.

According to this theory, those who pretend to have observed zodiacal light on the moon must be right. All the planets and satellites must have zodiacal light and Gegenschein, more or less according to size and distance from the sun.

If these views are correct, artificial light is not pro-

duced by the motion of the oxygen or that of the molecules of fuel carried away by it, but would be produced by the repulsive action of combustion acting upon the radiant matter of space; or some matter would be turned to the radiant state through the act of combustion itself. This latter hypothesis may contain the true explanation of the effect of gas mantles, which would be an increase in the percentage of gas turned to the radiant state, on account of the incandescence of the mantle. Otherwise the substance of the mantle itself may possibly emit radiant matter.

The reason for making these remarks is that artificial as well as natural or sun light produces motion of the gyroscope vanes which are enclosed in a vacuum bulb, and consequently the motion of gaseous bodies outside of the bulb could not reach them. Neither could the black side of the vanes absorb gas as it absorbs radiant matter which is the cause of their motion. Besides the artificial light effect itself should not penetrate into a vacuum bulb if directly dependent upon caloric combustion. I entertain some doubts that even sound is propagated through air waves, though air would interfere with its propagation.

Hitherto it has been assumed that light is propagated through space at an even rate of speed, what-

ever the distance of the focus from which it is emitted and whatever the intensity of emission may be. Without arguing that it is not so, I would at least suggest that it may not be so unless there is positive evidence to that effect. The angular velocity of radiant matter around the sun decreases with the distance from the sun, as indicated by the varying speed of planets on their orbits and a similar slackening of speed might incidentally be found in light. The speed of the electric current itself is variable.

It is easy to understand on mechanical principles a transverse wave motion with the light effect out of elastic radiant matter possessing repulsive energy whose repulsive action is resisted, but when it comes to applying the same reasoning to something of the description of ether, the only light to be found out is darkness. With the ether and the present theory of gravitation, the ether could not, would not have to, and should not produce any repulsive action. Then why in the first place does it not illuminate space at large as well as the surface of bodies? What would cause its waves to be transverse? How could it have so many different lengths of undulation, being all of one kind? How could it undulate at all and be elastic if it fills all space without a single point where it is

not present, and besides is immaterial? Or if material it should fill all space; what kind of matter could that be that offers no resistance to the motion of other bodies? How could undulation be imparted to it at all if it offers no resistance to motion and nothing has any hold upon it?

If anything could have any hold up it, then it would offer resistance to the motion of celestial bodies and stop that motion if Newton's theory is correct. If nothing can have any hold upon it, how can it be involved in any electrical phenomena? How could its undulations represented by light impart the rotary motion to the gyroscope which represents expenditure of energy?

If it has weight, no matter how minute, then it is material; it would possess attraction for itself and for other bodies and would offer resistance to their motion. All its properties or virtues would have to be antagonistic and it bears its own stamp, that of fabulous entity born from necessity of the moment.

IX.

Light, electricity and magnetism are not themselves material any more than heat or cold, but all of these effects are produced by matter all the same, and **the only conceivable way that matter can produce them is by motion of its particles**; though cold and magnetism may be produced by a lack of such motion, or at least by a reduction of its amplitude; but besides when a certain degree of cold or magnetism is reached, there is propably a collapse in the form of motion whereby the latter is modified, such as at the point of liquefaction of a gas for cold. At such a point for magnetism the radiant matter would be absorbed by solid matter with a tendency to resume the radiant state when artificially produced. The particles of radiant matter have probably a rotary as well as a vortex motion.

The difference between heat and electricity may be due to one of four causes: Either the elements producing them are different or the state of division of the elements involved in either case is different and the speed or the form of motion may be different. Caloric combustion being provisionally assumed to be of a coarser nature than electric combustion, in the former

the motion of the particles producing heat would be molecular or atomic, and in the latter the particles would be divisions of atoms.

The difference in the two kinds of light would also be due to the same cause.

A charge of potential electricity, such as that stored in a leyden jar or any other insulated body, must be simply a charge of radiant matter of some kind or kinds which for the time being remains in a quiescent state, but which commences to whirl at the point of escape the moment an outlet is provided for it. That is why a person charged with electricity experiences a prick at the point of contact when touched, but feels nothing so long as the charge is undisturbed, and it is the whirling or vortex motion of the charge which constitutes the electricity proper, in any event the prime mover in all forms of motion of the particles of matter is to be traced to some form of chemical action or combustion, directly or indirectly.

The great Nicola Tesla is reported as saying: "Electricity is as material as this table." Undoubtedly some matter is involved in all electric phenomena, but it is not the matter involved that is the electricity proper; it is the peculiar motion of that matter. Just as heat is a form of motion so is electricity, and both produce

a repulsive action at a distance between the particles of matter involved.

Positive charges would consist of condensed radiant matter whose repulsive action at a distance would be proportional to the degree of condensation or pressure, we might say.

This increased repulsive action of radiant matter under confinement would give birth to negative charges by driving adjacent radiant matter of space down into the earth. The charge of radiant matter would be retained under bounds by the insulator, but its repulsive action would not be so confined.

The whirling or other motion of radiant matter in space is probably the reason why it is absolutely invisible and transparent through any extent of it. Even the spokes of a wheel rotating very rapidly are rendered almost invisible and transparent thereby, and this is probably a good analogy of cause and effect. The radiant matter remains invisible so long as its natural whirling motion is not disturbed, but when it is sufficiently disturbed on a large enough scale becomes visible as in zodiacal light, comet tails, and possibly in nebulae.

X.

It is held in electrical science that when an electrical impulse is sent through a wire the impulse does not travel at the surface but is transmitted through the substance of the wire. This implies that either a peculiar motion or vibration is imparted to all the particles of matter forming the wire or to something else that would be interposed between said particles. Of the two suppositions, the first is by far the more likely, and it may seem strange only because we know so very little about the properties of matter and its modes of action in its minutest divisions. We wonder at the phenomena with which we are not familiar; yet what is more wonderful than fire, which we can start and stop; where we actually see "inert matter" actively and freely in action by itself in the leaping flames; where some matter vanishes from our sight, giving us light to see the disappearance, and at the same time may transform the condition of all kinds of bodies as with a magic wand?

Electrical phenomena are found more wonderful than caloric phenomena solely because they are less familiar and less understood.

That all the particles of matter in a wire one thou-

sand or ten thousand miles long should be concerned in transmitting an impulse imparted at one end of the wire is not more inadmissible than that an impulse started from the sun should be transmitted to the earth in a few minutes through a beam of radiant matter at least 93 million miles long. If the medium of transmission were the ether the fact would not be any less surprising, but a great deal less comprehensible. Then if the accuracy of the transmission of impulses through the particles of either solid or radiant matter were once demonstrated, the demonstration in either case would almost apply to both. If it were the ether instead of the substance of the wire itself that was concerned in the transmission of electrical impulses, what would prevent such impulses being transmitted indifferently through any kind of metal, through glass or silk or any other kind of matter, since the ether is assumed to inter-penetrate the molecules of all substances? Surely the ether is not in it here.

The fact that a small wire transmits electrical impulses quicker than a large one is incontestable proof that it is the substance of the wire itself which is concerned in the transmission, because the small wire contains less particles of metal to move than the large one and the energy of the impulse not being so much

divided reaches the other end faster. The same reasoning cannot apply to the ether if it is not composed of particles. The ether in its assumed nature or character would utterly fail further to account for charges of electricity. Such charges cannot be ether, ether waves, or any other form of ether motion; and since the charges must consist of something else, that something alone can account for all electrical phenomena, and we may as well dismiss the ether altogether.

It is probable that the bodies called elements are not the real elements but that each is composed of as many elements as there are bright lines in its spectrum, which may or may not themselves represent the ultimate elements. If they do not, a sufficient rise in temperature should change the appearance of the spectrum, which is what actually takes place.

The sparks spurting out from the end of the brushes of a dynamo and the sparks produced by striking a piece of flint with a piece of steel, or by sharpening a tool on a dry grind stone and in many other ways are likely to be produced by the same cause, namely, a swift whirling motion imparted to minute particles of either or both bodies submitted to friction, whereby said particles would pass to the radiant state. If correct, this would give definitely the explanation of

the nature of electricity. It appears that friction of one kind or another is an invariable condition in all methods of generating electricity when the same is not generated directly by chemical action, and the electricity would be born at the point where the friction takes place, the substance submitted to friction supplying radiant matter. This is necessarily the case if the sparks from all sources are of an electric nature, which they must be; but even if they were not, the difference would be only in kind and not in the primordial cause or principle involved for their production. Such sparks surely have nothing to do with the ether.

Two hard bodies come in violent contact, the violence of the shock being due to their hardness, because there is no yielding or elasticity in the substance of either body; yet if there is anything at all that can yield in either or both bodies, it will yield. The only thing in this case that can yield consists of the particles of matter lying at the surface of the two bodies where they come in contact, and it must be these particles which fly off and produce the sparks. The shock of the two bodies being a sliding one, it is just what is required to impart a rotary or whirling motion to the particles of matter coming in collision.

The striking of a piece of steel and other hard bodies with a hammer will also produce sparks.

It is easy to conceive that the shock may produce a sliding of the particles receiving the blow directly, and this sliding of particles upon other particles will cause them to whirl also, specially if rounded or spherical. Those particles which cannot fly off because they are not at the surface are also brought into some sort of vibration by the shock, and this subdued vibration takes the form of heat, which is gradually divided between all the particles in the mass; but the particles which produce the sparks pass to the radiant state. Their colliding or their moving confusedly in a narrow space produces a spark which spreads them in all directions and effects their final division as if by explosion.

It may be supposed that the combined amount of whirling motion imparted to all the particles of metal in all the wire convolutions in the armature of a dynamo is transferred to detached particles of radiant matter, which are thereby made themselves to whirl, and thus generate electricity.

Special import is attached to this theory of the transferrence of motion from solid to radiant matter, in which motion of solid matter would be transformed

into repulsive action of radiant matter. The radiant matter involved in generating electricity through a dynamo would be detached by the friction of the brushes as said before, and this would be a transformation of magnetism into electricity. The number of wire convolutions in the armature would probably bear a relation with the surfaces of friction affecting the voltage. By increasing the frictional areas and the pressure of the brushes for a given number of wire convolutions in the armature more radiant matter would be produced, but the whirling motion of each particle would not be so rapid or so extensive. The opposite would be the case if the number of wire convolutions were increased instead.

All electrical and electro-magnetic phenomena must be produced in some way by transformations of electricity into magnetism or of magnetism into electricity, which means transformations of radiant into tangible matter or of tangible into radiant matter.

XI.

According to Camille Flammarion, (Astronomie Populaire, page 303), the number of atoms of metal in

a pin's head is estimated at eight sextillions (8,000,000,000,000,000,000,000).

If a sand mountain having that number of grains of sand had to be removed and a man were to remove it at the rate of one thousand million grains per second, working day and night without interruption, his job would last two hundred and fifty thousand years! If Adam were still living he would be a baby as compared with the age of this man on completing his task. Yet recent investigations indicate that the atom is far from representing the ultimate divisibility of matter. Even the radiant state is not likely to represent its ultimate division. These are considerations which it is absolutely essential never to lose sight of in analyzing the operations of radiant matter, whether under the process of its absorption or emission, and shows us how little solid matter is required to develop an immense quantity of radiant matter and electricity. Then matter would be brought to the radiant state not only directly by combustion, but also indirectly by friction, and the same thing obtains with heat, which is one more point of analogy.

It would appear also that good and bad conductors of electricity bear more or less the same relation to heat. The fact, however, that the propagation of heat

through bodies is so slow as compared with electricity may be due to one of two causes, or even both. One possible cause mentioned before would be a difference in the form of molecular or atomic motion, which itself could be due to a difference of form in the molecule or atom, and another possible cause not yet mentioned could be due to heat being of a coarser nature than electricity, if as suggested caloric combustion is of a coarser nature than electric combustion.

That this is the case is the logical conclusion to be drawn if the splitting up of atoms takes place in electric combustion while it does not in caloric combustion in which matter does not pass beyond the gaseous state while the radiant state is involved in electric combustion. The very small amount of tangible matter involved as such in the generation of electricity, whether by direct combustion in a battery or by friction, would apparently be the cause that electricity has remained so long a mystery.

The points of resemblance between heat and electricity are indeed too numerous to be dismissed as mere coincidences, and having so much resemblance, they must be produced by similarity of causes.

Primarily there are only two known ways of gene-

rating energy by chemical action. One of them is the chemical action of caloric combustion.

Therefore, chemical actions generating electricity must be considered forms of electric combustion.

It is quite likely that there is in Nature some great principle yet undiscovered for generating electricity directly by chemical action, which would make electricity more than a rival for heat in most of its uses, but it is no doubt a mistake to consider coal as the element most likely to provide the electrical fuel. Probably every element in Nature could be involved in combustion of one kind or another if the proper conditions were known. The many explosive compounds discovered in recent times point to many other discoveries of the same nature to be made in the future.

New reversed explosions, such as that producing the chemical combination of hydrogen and oxygen to form water may also be discovered.

XII.

A few more words concerning the ether. If the ether permeates the molecules of all bodies and moves

freely through them it is not easy to see how it could be confined and put under stress.

If electricity consisted of ether or of any form of ether motion we find that the same would have to be propagated almost instantly through the substance of a long telegraph wire, while a few feet of air would offer a stubborn resistance to its passage; but it would move freely through the air for producing light! If the ether can move freely through some bodies and not through others, why? And how is it that it will move freely through glass to transmit light, while the same glass will retain a charge of electricity, positive and negative? We have no reason to assume that flames of any kind are ever produced without some matter being consumed or changed in condition, even if the change lasts only as long as the flaming out. What else but flames can sparks of any kind be, when all kinds give heat and light as well. Emery grindstones and other hard stones used dry are especially prolific in sparking, principally when running fast, but a wet stone draws no sparks; water drowns sparks as it does flames. If some matter is involved in the latter some matter must be involved in the former, too. Similarity of effects must be produced by similarity

of causes. Then is it ether that produces electric sparks or flames?

If it does it must consist of matter capable of changing its physical state; must be divisible into particles capable of attracting and repulsing each other according to conditions; must obey all chemical laws and be transformable into heat and light through all of them. What is the use for such an ether when common matter can do that? With radiant matter we have all kinds of matter to account for all kinds of effects, but with the ether it has to be all in one and responsive to everything.

When a strong current of electricity is passing through a copper wire no considerable heating of the wire takes place, but if a piece of iron wire be placed in the circuit it will become red hot. This shows pretty clearly that all the particles of metal in the wire are concerned in the transmission of electricity. Particles of metal which are not fully responsive to the impulse, as the particles of iron, are heated. Substances still more rebellious are either evaporated, decomposed or consumed, "radiantly" or otherwise according to conditions and kind of substance acted upon. All the heat effects are evolved by electricity besides others not produced by heat.

To invest an imaginary ether with all sorts of imaginary and contradictory properties, reversible or varying to suit the circumstances, and which would be absolutely incompatible if real, is an easy way to escape a dilemma, but such a convenient cloak can never amount to the real solution of insurmountable difficulties encountered with it.

The only reason for supposing the existence of the ether to be a fact would be as a consequence of the supposition that electricity or the matter producing it is localized around the earth and probably around the sun, so that the ether would act as a connecting link; but if the electric fluid is present around the earth there is nothing to prevent it being present in space at large, and it has been found, by kites and other experiments, to increase with the altitude where the air is more rarified. Where there is no air at all the electric fluid should be more dense still. What could be its boundary anyway?

Since even air offers considerable resistance to the passage of radiant matter through it, it is hardly likely that radiant matter can pass freely through solid bodies unless their particles offer a special structure or are disposed so as to move more or less in harmony with the radiant matter passing through them. But

it is not likely that all kinds of radiant matter pass through solid bodies at all when such bodies are good conductors of electricity. What is more likely is that the whirling motion of the particles of radiant matter which represent electricity is transferred to and divided between the particles of solid matter when the latter are of a nature adapted to receive this sort of motion. So that electricity would be transferred to certain bodies—the conductors—the same as heat. But the transference would take place a great deal faster than with heat and would also be rejected a great deal faster. Under strain radiant matter would leak through non-conductors more or less freely according to the kind of radiant matter involved and the degree of resistance or conductivity of the tangible body.

XIII.

When the earth is taken as a return current in the circuit, such as in electric railways, magnetism is transformed into electricity at the power station and the electric current is transformed back into magnet-

ism where it is led into the earth. It is as if water were pumped from the ocean at one point and returned to the ocean at another point, except that in the case of water there is no transformation in its state.

The current is generally understood to return to the power house through the rail, and it may in part, but at the same time the rail acts as a channel through which magnetism is "pumped" from the earth, so to speak, and thereby transformed into electricity. There is attraction between electricity and magnetism as there is attraction between heat and cold. It is this mutual attraction of electricity and magnetism which keeps the wheel at the end of the trolley pole fast to the overhanging wire and all kind of electric switches or keys closing a circuit. It is obviously attraction which holds a switch fast to the circuit without any visible fastening. Now what is the difference between this attraction and gravitation? It is one and the same thing. The pull on an electric switch is simply localized concentred gravitation. The magnetism transformed into electricity at the dynamo is transformed back into magnetism at the motor. The magnetism offers resistance to its transformation into electricity and that is what produces the unaccounted for resistance to the motion of the armature of a dynamo.

The moment the electricity is allowed to turn again into magnetism by moving the motor the gravitational force of magnetism past the motor pulls on the current ahead of the motor and the intensity of the current holds together the members of the conductor forming the circuit.

Electricity in doing work is transformed into magnetism, the same as heat in doing work is transformed into cold; that is, the pitch, if we may call it so, is in both cases lowered a certain definite extent varying with the circumstances, but equal in value in all cases and in amount proportional to the work done with a given amount of power.

Electricity of low voltage represents magnetism or negative electricity to electricity of higher voltage, and they tend to equalize if given a chance. If the equalization takes place without doing work there must be still a loss of electricity caused by this equalization, as there is a loss of heat when hot water is mixed with cold, but if the electricity does work in passing from the higher to the lower voltage the transformation of electricity into magnetism is thereby increased in proportion to the work done.

It is equally to the mutual attraction of heat and cold that we owe all heat engines, and that is another

source of gravitation. But electricity expands or is dissipated into the solid earth and is thereby transformed into magnetism; while heat expands and dissipates into the open air and is thereby transformed into cold. It seems that while heat does not expand readily through solid bodies, electricity does not expand readily through gaseous bodies, but under the strain of a steady supply more electricity may be stored momentarily in gaseous bodies than in solid bodies, while it is the opposite with heat.

We can secure energy through the agency of a gas or vapor by heat imparted to it, but it is not the gas or vapor that is the energy; the latter is contained in the heat. Inasmuch as electricity also represents energy, it is also carried in or by a material agency, but that material agency is not the electricity proper any more than a gas or vapor is heat proper. Considering that the effect of heat is to produce expansion without increase of mass, we are warranted in assuming that this expansion is caused by an increase in the amplitude of motion of the particles of matter carrying the heat or a rise in their rate of vibration. The same reasoning is necessarily applicable to electricity. Hence the pressure of a gas or vapor is a pressure of

heat, while a pressure of radiant matter is a pressure of electricity.

But why is it that electricity is put under stress in the open while heat is put under stress in confinement? The reason seems to be that electricity, as stated above, expands or diffuses more freely into solid matter, while heat diffuses more freely into gaseous matter. When the electricity expands into the earth it is quickly diffused and transformed into magnetism, but not so when forced through an insulated conductor, the air being an insulator. Inversely, when heat expands into the air, it is quickly diffused and transformed into cold, but not so when forced through a line of pipe as contained in steam under pressure, the pipe being the insulator, which is more or less efficient.

A body is so much better conductor of electricity when it is colder because heat is a form of vibration antagonistic to or interfering with electrical vibration. In trying to figure out the "mechanism" of electricity or electro-magnetism as generated through a dynamo, the first and most important points not to be lost sight of are, first, that electricity in itself can be nothing but motion, while magnetism is a deficiency of motion as compared with electricity. This latter conclu-

sion is indicated by analogy with cold, for which the same reasoning applies. Second, that electricity is a repulsive while magnetism is an attractive force, each equal and opposite and attracting each other; and third, that both forces must act through distance in space, because neither can act otherwise. To this latter cause is no doubt due the phenomena of induction.

As to the details of electro-magnetic motion, they can only be guessed at by inference with more or less probability of approximation at the present time. We know that fire and consequently heat also is motion, because it can be nothing else, but we do not know the details of it any better except for that which can be gathered by inference.

It is very likely that if we could provide a free path for the peculiar motion of the particles of matter involved in producing fire and its transmission of heat without interference between themselves that motion would give us electricity direct instead of heat. On the other hand, if we put an obstruction in the free path of electrical motion, that motion is transformed into heat at that point. This is a pretty conclusive evidence that one of the essential differences between heat and electricity is that the motion producing the former is a kind of battling, confused, irregular mo-

tion, shock or bombardment of the particles of matter involved, while the electrical motion is a regular uniform motion of all the particles involved and which on account of this uniformity is rapidly propagated through the mass of a suitable material—a conductor.

The chemical action of a galvanic battery gives us electricity instead of heat because the motion generated by it is less impetuous and better adapted to develop a regular uniform motion than the chemical action of combustion producing fire and heat.

When we boil water in a kettle, the fire does not touch the water, but the latter gets hot all the same. Its getting hot must of necessity be caused by motion or vibration of the particles of metal of the kettle, which motion is transmitted to the particles of water. This is clearly a transmission of motion of the particles of different bodies in different states. Then although the kettle is not in apparent motion, it is really in motion, a very rapid motion at that; it is invisible because each particle of the kettle moves in situ, i. e., vibrates without changing its position, but this motion is transmitted in part to the water and in part to the surrounding air. This motion cannot be entirely isolated, it is gradually diffused, i. e., transmitted to other matter. Then suppose the kettle is moved bodily

around by mechanical means. All its particles will be again in motion, though in a different way or a different form of motion. But why may not that form of motion be transmitted so as to reproduce itself in kind or form? That is what we see accomplished in an electric motor receiving its impulse from a dynamo. It is the motion which is transmitted from the dynamo to the motor, not a fluid or anything else, though I do not see what else it could be. But the motion can be transmitted only through something that moves, i. e., receives the motion and transmits it. This means that every particle of metal in the transmitting line of wire is put into swift motion or vibration as the metal of a kettle is by fire, but the form of motion is different, giving but little heat, because there is very little opposition to its propagation through a conductor.

However, the most direct and positive proof we can have that all the particles of matter in a circuit are involved in the transmission of the current is in the fact that we can actually feel it by making it pass through our body. What is passing through our body is a transmission of motion pure and simple, (as much so as a punch on the nose). A burn on a part of the body is also a transmission of motion, but the primary effect is local; it does not shake the whole body as an

electric current. The mode of motion being different, it does not spread through matter with the same speed.

Wherever you find or know there is corpuscular motion of matter there you will find electricity. Inversely where you find electricity you may know there is corpuscular motion of matter. By corpuscular motion I mean motion or vibration of matter in some of its minutest divisions. We may therefore assume that all forms of life, animal or vegetable, generates electricity—a fact recently demonstrated by scientific experiment. We may even assume that all motion of matter in any state generates electricity when it is not heat that is generated; and both may be evolved at the same time.

Concerning the electrical motion, the next question is: What is it that moves? Matter of course, because there is no motion conceivable to man outside of matter, whether we see it or not and whatever may be its state, kind, quality or properties. It is assumed here that any kind of matter will generate electricity if the right mode of motion is imparted to it in any manner, provided it is adapted to receive it.

The fluid motion producing fire imparts heat—some of its motion—to all bodies in any state, solid, liquid or gaseous, and probably to the radiant state

also. Similarly the electric current may volatilize any kind of matter in any state in the electric furnace. Fire being born in fluid motion it must be assumed that electricity is first generated by fluid motion also. This latter fluid motion can be transmitted to a long distance through copper wire as the fluid motion of fire can be transmitted to water through the wall of a kettle.

From these considerations, the inference is, as stated previously, that electricity is first started at the end of the brushes of a dynamo, as the electric match, where some solid matter is turned to the radiant state and apparently that more radiant matter is pumped from the earth or from the stationary magnet by the armature. The motion of the latter radiant matter is sluggish before it is pumped, but a great velocity is imparted to it by the motion of the armature. The radiant matter pumped through the field magnet may not exist in the radiant state before it is pumped but may be evolved in proportion as a vacuum of radiant matter is produced by the pumping action of the armature. Thus the radiant matter circulating through a permanent magnet is presumably derived from the magnet itself. The act of tempering the steel left a peculiar stress within its structure which would cause

some particles of metal to get loose and these being once set uniformly right in direction of polarity would move indefinitely through and around the magnet in virtue of their mutual attraction and the lasting stress of the steel. This view is borne out by some experiments in which the bending of cold iron or steel is shown to produce traces of magnetism around the bend.

It is understood that radiant matter is necessarily playing a part in the generation of electricity and I presume that it does all along a closed circuit, but not necessarily so. The repulsive and attractive actions of conductors in a field of force might take place at a distance direct from the metal of the conductors without involving the radiant matter of space or without emitting radiant matter themselves, but this is considered unlikely except where the conductor is well insulated beside air insulation. But it does not follow that the radiant matter generated or energized at the dynamo must travel through the whole length of the circuit; this I consider unlikely.

All the experiments that have been made in the investigation of electricity and magnetism indicate that something is moving, either in the form of detached rings or of spirals with any number of close convo-

lutions. The lines of force in a permanent bar magnet are comparable to a bundle of rings all passing through and held by another ring, which is the magnet itself, the bundle of rings spreading at right angles all around it and turning within it. On the other hand the apparent motion in an electric current is concentric with the wire carrying it. My idea is that what circulates through a permanent or an electro-magnet is radiant matter of very low tension whose rings are cut off by the attraction of the swiftly moving turns of wire in the armature of a dynamo, or by its core, this making them jump to the latter which is thereby turned into a magnet, from where they enter and are strung on the wire wound around the armature and forced out along the line of wire forming the circuit. This implies that no matter how the rings of radiant matter may be cut, broken or twisted, they instantly form again into rings smaller or larger, but with a permanent disposition to fly around.

Whether the current of radiant matter thus generated and energized by the motion of the armature follows along the whole length of the circuit or only for a short distance, to be gradually dissipated into space, is a matter for conjecture, but in any event it imparts some sort of vibration to the particles of metal

of the line which transmits and may reproduce at any point on the line the original motion which produces the current.

It is understood that whenever a discharge of electricity occurs in the form of sparks, it is carried by matter in the radiant state, but that does not involve the necessity for said radiant matter to travel from the point where the electricity is generated to the point of discharge if the distance is great. If the sparks are taken from a heavily charged circuit through a grounded body, which does not come in contact with it, and whenever sparks are produced, it cannot well be imagined how they can be produced without matter, but the substance of the wire carrying the current being in a state of electrical stress, some radiant matter may be detached from it at any point, unless it is the air in the spark gap which is turned to the radiant state in the production of sparks. The latter supposition is considered improbable. Sparks from a grindstone and sparks from any source must be of the same nature, and there is no reason for assuming that the air enters in the production of sparks from a grindstone.

We cannot see matter in all of its states with our material eyes, still less what is immaterial; even the

gaseous state makes matter disappear to our sight. Therefore, all that which we do see involves some matter in its manifestation most necessarily. We can see sparks as well as flames, and the inevitable deduction is that some matter is involved in the production of sparks as well as in the production of flames. The amount of matter may be and probably is very minute in either case, but the amount of it is of secondary import. A spark which jumps upon a man's body may kill him if powerful enough. Such a violent effect could not take place through a medium involving no matter in its manifestation. It is an action of matter upon matter, the first of which is loaded with a powerful charge of motion or kinetic energy. The swiftness with which this motion is transmitted destroys the normal rhythmical motions taking place in the particles of matter forming any living animal body and which constitutes its life. Some other kinds of sudden shock, such as a blow on the temple, may produce the same effect. Similarly a gust of wind will blow off the light of a lamp, but it may be lighted up again. Electrocution is a gust of electric wind which blows off human life. It is likely that for a time all electrocuted persons could be revived if we only knew how, so long as the functional capacity of no

vital organ is hopelessly destroyed. Electricity itself of suitably low voltage should play a part in restoring the subject to life again.

The fluid motion producing fire imparts heat to other bodies, but that fluid does not itself enter or circulate through them and it is inferred that the fluid motion producing electricity may and probably does act on the same principle.

When one end of an iron bar is heated red or white hot the other end of the bar will be hot also if not too long, even though it may have been thoroughly shielded from the direct action of the fire. The outer end is by far less hot than the directly heated end because no solid matter is a very good conductor of heat; or stating it differently, because heat is a form of motion which cannot be transmitted rapidly through solid bodies, and only through short distances.

In the case above the fire did not travel from the heated end of the bar to the other end nor entered it at any point. What is it, then, that did travel? I consider this question analogous to the question, "What is it that travels along an electric circuit?" and the answers must be also in a measure analogous.

Although the fire did not travel through the bar, its

cooler end got sufficiently heated to radiate heat into space around it. I assume that an analogous effect can take place along the path of an electric circuit where electricity is radiated instead of heat. But electricity does not radiate readily into the air; it radiates readily into certain metals and the earth, hence the effects of induction. As a body absorbs heat slowly it parts with it slowly. But the electrical form of vibration is instantly absorbed and instantly rejected by certain bodies—the conductors, while other bodies offer resistance more or less pronounced to its passage, in consequence of which heat is evolved therein.

Every body has its normal electro-magnetism as it has its normal temperature. Here a new word is needed to correspond for electricity and magnetism to the word "temperature" for heat and cold. For brevity and convenience I propose the word "elemate," being formed of the two words electricity and magnetism.

Inasmuch as electricity and magnetism attract each other as heat and cold attract each other, a current of electricity attracts the normal elemate of the air and of all bodies as a current of steam passing through a pipe attracts the normal temperature of the air and other bodies, because there is in both pairs a difference of

"potential" and a tendency to equalize by mutual exchange.

For this reason the bodies containing either difference of potential must be attracted toward each other. Indeed it is apparently within these two forms of attraction that is to be found the true secret of what is called universal gravitation and of all phenomena of polarity.

The cold and magnetism of the earth and the heat and electricity of the sun attract each other with a degree of intensity proportional to the density of the earth, which corresponds to its capacity for transforming heat into cold and electricity into magnetism, so that the distance of the earth and of every planet from the sun corresponds to this capacity based on their respective density. Forcible shortening of a planet's orbit would make it receive more heat and electricity than it could transform, at the same time reducing its capacity for transforming. The result would be swelling of the planet, and on being left loose would be driven beyond its normal orbit until brought back by gradual cooling. This implies that the normal temperature and elemate at the surface of all planets is equal, the native supply compensating the deficiency of that received from the sun. The presumption is also that

in proportion as the density of planets increases their orbit is shortened thereby, and that the same effect is produced by gradual decrease of solar radiation.

The Amperean currents of electricity are probably produced by the motion of the earth round its axis and around the sun. The whirling motion of all the particles composing the earth would be transmitted to a certain amount of particles at the surface producing currents.

Electricity being in a measure comparable to heat, all bodies may be more or less electrified as they may be more or less heated; but it looks as if electricity were what we might call the heat of radiant matter, and heat proper the heat of tangible matter.

Heat applied to radiant matter should increase its electrification and electricity added to heat should increase the heat of the tangible matter. When two electrified bodies first attract and then repel each other, it may be assumed that the charge of radiant matter upon each body has not the same degree of electrification before the attraction and that the attraction producing contact equalizes the electrification, after which the two bodies repel each other.

The friction of a soft body would detach more radiant particles of that body than the same amount of friction on a hard body, in consequence of which the

number of particles of radiant matter evolved by the friction would be less on the hard body than on the soft body. The two bodies would contain the same amount of electricity, but that on the hard body being contained in fewer particles would be under a higher tension if the surface of both bodies were equal, and this excess of tension would tend to equalize with the lower tension on the soft body. The hard body would contain a positive and the soft body a negative charge.

Similarly the temperature of two bodies when it is different will equalize if given the opportunity, after which they should be found to repel each other, principally if the temperature is still high after equalization. The equalization of temperature between bodies may take place by contact without either body leaving its position, and under proper conditions the same may obtain between opposite charges of electricity.

According to the foregoing, the friction of many if not all bodies would evolve radiant matter containing electricity, and while the radiant matter would be of many kinds the electricity would be all of one kind, whether produced by friction or chemical action, in the same way that heat is all of one kind whether it is produced by the combustion of one kind of fuel or another, or in any other way.

What we call a charge of static electricity is a charge of radiant matter under stress. There is no electricity in it so long as it remains undisturbed and well insulated; there is only a potentiality for producing electricity, and the moment the chance is given it the electricity is produced by the rapid motion of the radiant matter and the charge disappears.

In electrolytic action, what obtains is electrical evaporation, by or with dissociaton of elements, while heat produces evaporation without dissociation.

The colliding and rolling of clouds over each other generates electricity which, being thus imprisoned in the mass of a non-conductor—the air—has to make a vent to reach a place where it can expand more freely. This is what gives us the flash of lightning or thunder which rents the air to make a passage, thus spreading the charge and giving it a greater area for expanding more gradually and thus vanish. The length of the flash is of course proportional to the charge and it follows the line of least resistance. When opposite currents of relatively hot air are moving fast enough they generate electricity in abundance, and if they are charged with moisture give us thunder-storms because the peals of thunder shaking the air cause the moisture to condense and agglomerate swiftly and pre-

cipitately fall. When the opposite currents are composed of relatively cold air, however, the latter is then a better conductor of electricity and this spreading more readily through the mass of air gives us no thunder.

Cold increases the electric conductivity of air as it does for other bodies. For this reason the atmosphere is more charged with electricity in winter than in summer, and thunder-storms are less frequent in winter on account of this increased conductivity. The greatest cold on the earth may be assumed to occur at the magnetic poles where the most electricity is transformed into magnetism, while most heat is transformed into cold at the equatorial regions, principally through the luxuriant vegetation. Consequently the magnetic poles are also the poles of cold. This will furnish the explanation of the north and south polarity of the magnetic needle and of its diurnal, monthly, and annual deviations. As to its secular deviations I suggest that they may be caused by the work of man in changing the vegetal conditions of the earth surface, such as opening new localities or countries to agricultural pursuits. Increased vegetable growth would transform more heat into cold and thereby lower the average temperature of the locality, while

decrease of vegetable growth would have an opposite effect, and this would tend in turn to alter the position of one or both poles of cold and magnetism. The same cause could also produce slight annual variations.

It is assumed in any event that the deviations of the magnetic from the geographic poles are due principally to geographical configurations and vegetal conditions of the earth's surface. The reader desiring to weigh the probability of accuracy of this theory is referred to the article "Magnetic Poles of the Earth—Secular Variations" in the Encyclopedia Britannica, Vol. XVI, page 163.

The capital facts concerning electro-magnetism are considered as pretty well established, namely, that electricity and magnetism are in themselves nothing but motion of matter; that electricity and magnetism are the opposite poles of one single continuous force with an unknown number of degrees in its scale, transformable both ways the one into the other; and that this force is derived from the chemism of matter. As to the inner workings of electro-magnetism, an attempt has been made to clear out some ground, but it is not presumed that these dissertations, even if all correct in the main would settle everything that is to be settled by any means. Therefore all these considera-

tions are given only as suggestions to investigators, not as final conclusions, but on the whole they are believed to lead in the right direction.

XIV.

The inclination of the axis of all the planets appears to be in the same direction as far as known. The inclination seems to be inversely proportional to the speed of the axial rotation, the inclination being least where the rotation is the fastest. These facts would seem to indicate the existence of relations of polarity between the sun and the planets which would be the cause of the inclination of the axis of the latter.

The axis of the sun itself may be inclined on the plane of its movement of translation. As understood, the speed of rotation would tend to disturb the polar attraction, while a body not turning upon its axis, such as the moon, would always present one and the same pole, maybe more or less inclined, to the body around which it moves.

Such relations of polarity must exist anyway, but the action is not clear, as each pole of the planets comes alternately to be the nearest to the sun. In any

event, the poles of cold and magnetism on the planets would be the ones acted upon by the sun's polarity and not the geographical poles.

XV.

As regards attractions and repulsions, the attraction of gravitation evidently takes place at a distance through space since the attraction of the planets upon each other resides in their own substance, and this is the combined attraction of all the particles of matter in each planet, without interference between them, so that the attraction cannot be confined and put under bounds.

This gives us an illustration of the repulsive action of radiant matter which is diametrically opposite to that of tangible matter, and for the same reason its particles have to repel each other at a distance, but while these particles can be confined and put under stress, their repulsive action cannot be so isolated. The increased repulsive action they exert upon each other under stress is brought about by their displacement from their respective center of repulsive action, and this remains vacant in their absence, other free

particles in the radiant state not being allowed to occupy it. If the radiant matter in the electric charge has been generated in any way and not extracted from the radiant matter of space, some magnetism has been transformed into electricity and an equal amount of the radiant matter of space has to be driven down into the earth where its electricity is transformed into magnetism.

That both the attractive and repulsive actions between the particles of mater must take place at a distance is evident from the fact that there is no other conceivable way for them to take place, for if it were not so all the particles would have to occupy the same space as one of the particles. In the contraction of solid matter it might be argued that the particles themselves are contracted in volume, but while this might be the case, the force impelling the particles to contract would still act at a distance since each particle occupies a different space and they could not be bound together in a solid mass if they had no attraction for each other at a distance.

The repulsive action at a distance between the particles of radiant matter is still more evident than the attraction at a distance, except that of gravitation, because they occupy a vastly larger space than in solid

matter. Furthermore, we have seen before concerning chemistry, that all chemical actions are necessarily produced by repulsions and attractions between the particles of matter, and such attractions and repulsions must inevitably take place at a distance for the excellent reason that there is no other way for them to take place. The combustion of fuel is a striking example of attraction at a distance which takes place between the atoms of oxygen and carbon.

The mechanism of combustion appears to be started by a peculiar motion imparted to some of the carbon molecules or atoms and this molecular motion being once started it is successively transmitted to all the particles of the mass whereby the marriage or union of oxygen and carbon is effected. All chemical actions must be produced by a change in form, speed, or amplitude of motion of the particles of matter involved resulting from their union or disintegration; or the particles would pass from a state of rest to a state of activity or the reverse.

The particles of all compressible fluids, such as gases, do not fill the whole space in which they stand in the normal state, otherwise these fluids would not be compressible, yet there seems to be no doubt that these fluids are composed of individual particles, what-

ever their state of division or of further divisibility may be, and consequently they must repel each other at a distance.

We know that it is through the abnormal repulsive action imparted to the particles of matter by heat that we secure energy for doing work. Since we are enabled to use energy for doing work through the medium of electricity, the same must be contained in something substantial, capable of being confined and put under stress or pressure, and this evidently means repulsion at a distance between the particles of something. The ether? We may as well leave it in peace since we know that the particles of common matter are themselves capable of repelling each other at a distance whether their repulsive action be brought about by heat or electricity.

XVI.

Difference of color must be due to motion like every other immaterial effect or entity. It would be produced by difference of speed as held by physicists. Every other quality and property of matter may also

be due to a difference in vibration, and consequently matter in its essence may be all of one kind after all. This implies that every particle of matter in any state is in a continuous state of vibration. In any event, if matter is all of one kind as many physicists are disposed to assume there must be one cause, or principle through which it may present so many different aspects, and there seems to be no other than a difference in vibration. It would be different if it were assumed that matter is of at least three essentially different kinds; but all one kind means that all particles of matter in its minutest division are exactly alike in every particular, and this being the case would leave only the difference in the form of motion or vibration to give it a basis for possessing all the attributes and properties we find in it.

Every power of nature being necessarily derived from matter, its everlasting vibration in one form or another is not an untenable proposition. There are at least five possible kinds or forms of regular vibration: (1) Reciprocal or back and forth in a straight line; (2) axial rotation in one direction; (3) oscillatory or back and forth around the axis; (4) circular, or describing a circle; (5) oscillatory in a semi-circle. Then some of these may be amplified more or less; and also, two

of the forms cited above may be embraced together, such as axial rotation with circular movement.

This is suggested without arguing that it is or is not the primordial mechanism of matter, but merely as a possibility, yet a probability if matter is all of one kind, and this is yet to be found out.

It is known that the first form of vibration cited above does exist and seems to be everlasting. It is known as the Brownian movement. It is not at all certain, however, that the Brownian movement represents the form of vibration of the ultimate particle of matter, though it may. But if this is the only kind of primordial vibration to be found in matter, then matter is of more than one kind. On the other hand, if matter is all of one kind, its ultimate particles have more than one form of vibration, none of which forms is permanent but changeable, though it may require heat or electricity of a very high degree to effect the changes. So far the Brownian movement has been found unaffected by heat or electricity, though the particles of matter examined were presumably not the ultimate. This indicates a probability that matter is of more than one kind.

Instead of being of fewer kinds than we know of it may also be of many more. That is to say, what we

call elements may be composed of many primordial elements. Inasmuch as every element is distinguished by many lines peculiarly its own in the spectroscope I hold as likely that every line represents at least one primordial element.

XVII.

We do not feel the difference in the normal electricity and magnetism or elemate of the earth or of the bodies with which we come in contact as we do with heat and cold, because the life of our body is apparently maintained specially by caloric combustion; but it is likely to be different with cold blooded animals, like fishes and frogs in which the spark of life must be maintained by electric combustion, since the fluid they live in—the water—would absorb the heat their body could develop as fast as generated, and their temperature could never rise above that of the water they live in. Besides it is hardly likely that water contains enough free oxygen for producing caloric combustion in the body of fishes through their breathing. The electrical phenomena exhibited by various fishes is

also of a nature to confirm these views, and there is probably a great deal more to learn on this latter subject than is known at present. It is likely, however, that electricity plays a part in the life of hot blooded animals, which may vary with each individual, but caloric combustion must predominate.

XVIII.

Here we may again exclaim: The universe is an unbounded laboratory and all its life and motion are evolved from chemistry.

If the chemistry of matter can do that much, there is no special or any reason why it should stop there.

In the same way that chemical evolve physical actions, the latter may evolve the intellect or spirit.

Nothing is lost in nature which is ever active in transforming and a Divine Essence must pervade it. The doctrine of evolution of physical manifestations from a lower to a higher order deserves careful consideration. Our thoughts, for instance, are physical actions emanating from lower physical actions. They are a power or entity in themselves and are never lost. It is seemingly this power that evolves the apparent

wonders of hypnotism and miraculous cures. We can repeatedly recall a thought after it has been forgotten. We can recall all our thoughts in the hypnotic sleep and also in the short space of time when one is in imminent and immediate danger of instant death by accident, such as a fall. They may be contained in brain cells, but they have an existence and are liberated at the death of the body. This must be the reason why they shoot out at an instant the life of the body is expected to be cut short. Those who have experienced a dangerous fall and survive wonder at the apparent length of time that elapsed in the fall, permitting them to review their whole life, which they all do. The greater part of this apparent time, however, may be that which elapsed after the fall and before they regain consciousness, when the thoughts have returned to their cells. In such occurrences the death blow is probably not felt and the death may have occurred before the fatal stroke is actually consummated, as is evidenced by deaths from fright without bodily injury.

In cases of recovery the spirit has apparently been temporarily out of the body. Indeed, according to alleged spirit communications, it happens in some rare cases that persons have been dead for some time be-

fore they realize the fact, although in full consciousness.

These considerations lead to the conclusion that our entity cannot vanish at the grave, and that all that we can see is not all that exists. The real man is not the matter of his body any more than heat is the matter that produces it.

Man is more of a spirit, even in the material world, than he is generally prepared to admit. He is a spirit in the chrysalis. Since nothing can be lost or annihilated in nature, what animates the body can not be destroyed when the animation stops. When heat disappears it is not lost, it is transformed into cold or other force. Similarly, when the life of the body disappears it is not lost, it is transformed into something else or into a different condition.

In fact it can be said that **all the real powers of nature are things which in themselves are immaterial, consisting of motion and the capacity to produce it.**

They must consist of that because it is logically inconceivable what else they may consist of. All that we have to explain all, is matter and motion of that matter, which science calls inert. The motion may vary in form, in amplitude, in speed, in complexity, in kind and shape of moving particles, in size of the same

which may be simple or compound of one or many kinds, and in vast agglomerations of particles of all kinds constituting celestial bodies and groups of bodies, but it is always motion. Even the rest of matter could be only relative and not absolute. It is presumable that not a single atom of matter in the universe has ever occupied exactly the same point of space twice, or once for one second of time in all past eternity, since the sun and stars are themselves moving through space at a tremendous speed without following a regular periodic course, and seldom if ever come again to the same regions of space.

Repulsions and attractions at a distance are immaterial in themselves; they are what we might call the spirit of inorganic matter. "Matter is intelligent," said the celebrated Edison some years ago, and so it is, but besides, it must be also the source of all born organic intelligence.

The combustion of fuel producing fire for instance is a chemical action which is brought about by molecular or atomic motion. One result of this motion is the chemical change of properties of the matter involved and its change of condition or state; but besides this change has evolved heat from cold, both of which are immaterial in themselves; yet this something imma-

terial is one of the mighty powers of nature. It can be transferred to other bodies. It can be transformed back into cold or into electricity, magnetism or light, although light has also been evolved together with the heat. All of these are physical actions, all immaterial, yet all essential to organic life as we have it; all concur to the motion of the universe. Now life in turn, and the motion of the universe are immaterial in themselves, but both are expressions of motion. Instinct and intellect must be still higher expressions of motion since they can not be themselves material, but these subjects will be studied more in detail in the last part of this work.

XIX.

Many words have been coined which are constantly employed to express or define some entities or effects which yet would be utterly meaningless unless such words refer to matter and motion of matter in some form, such as force, energy, electricity, magnetism, heat, cold, light, radiation, reflection, refraction, diffraction, dissipation, sound, taste, smell, etc. and the nonentities, the ether, phlogiston, etc,

It does not seem to have occurred to men's minds that the only conceivable and definable immaterial entity, aside from Time, Space and Number, is motion or the entities representing embodiments of motion. Every quality, effect or property of matter is necessarily related to or expressed by motion. But, motion of what? It must be motion of matter of some kind in some state, unless it be also motion of motion. In the latter case accomplished motion would have to remain an entity in itself. This subject will be discussed later on. Putting matter aside with all its creations, expressed in motion, all that is left is Time, Space and Number. Anything else is beyond human concept. This is not an abstruse proposition or metaphysical utopia. What is abstruse is the attempt to conceive and define the inconceivable, as is done now by assuming the existence of entities independent from matter, its motion, and its own capacity to produce it through its properties of attraction and repulsion. How could we conceive of a quality as an immaterial entity for instance independently of matter and motion? It is the kind and embodiment of motion that makes or made the quality, either in a material or spiritual sense, and matter is the factor of motion. Thus any action, good, bad or indifferent is accom-

plished by motion; the thought of doing it is effected in and by motion. The taste of an apple, the smell of a rose, the color of both, the sound of music, the feeling of temperature or of any object to the touch, are all effects of motion—different combinations of kind, mode or speed of motion, and of kinds of matter in different states. If matter is all of one kind, its apparent differences can be attributed only to differences of mode or speed of vibration, either permanent or temporary. There is nothing else conceivable to man's mind to account for all the apparent differences, and physicists, I believe, are prepared to accept this view which is not entirely novel.

If the power to produce motion were not contained in or by matter itself we would of course have to assume the existence of material universal influences which man's mind could not apprehend. But the chemical properties of matter are clear enough proof that matter carries with itself the power to move itself, since such properties are necessarily expressed by motion. Otherwise we would have to assume the existence of immaterial influences different for each chemical effect, while matter itself would have no quality and would play no part in the chemical processes except that of yielding to such influences, which

is evidently quite absurd. The chemism of matter is clearly the base of all motion as a whole and in all its details, and the transformations or reversals of forces render chemism everlasting in its effects and potentialities.

When we consider that all kinds of matter are capable of chemically acting or being acted upon, which is equivalent, and that in all chemical actions minute particles of matter must of necessity by flying from one point to another, i. e., toward or away from other matter, of their own accord, it seems indeed wasted time to look outside of matter for an explanation of all its motions, without excepting the grandest of all—celestial mechanism. It is equally insensate to call it inert when its restless activity is manifested in thousands of ways whose culmination is life and when motion is its very principle and purpose.

You take a rock in your hands and say, "that rock cannot move unless I, somebody or something else moves it." But are you sure of that? Its inability to move is only relative. In the first place it actually supplies force enough to hurl itself permanently through space at a rate of speed that no cannon ball has yet approached. The energy which hurls it around the sun emanates from the sun, but the force

which makes it follow the sun in its flight through space emanates from the rock. As a part of the earth it contributes its own proportional share of attraction which makes the earth follow the sun, although at a distance of 93,000,000 miles. That is without taking into account the flight of the solar system as a whole.

Secondly, the atoms or particles of the elements forming the rock are bound together with a force such that probably only the electric furnace can dissociate them. Therefore they resist dissociation with a force proportional to the energy expended in effecting it. Since such dissociation can be effected, it is clearly force that resists it—force of attraction. After chemical dissociation of the elements of the rock they are now in condition to enter into new combinations and thereby generate energy or get ready to do so.

The electrical furnace is a chemical action or is derived from it as well as caloric combustion, and its effect upon the rock is equally chemical. It will act where the usual laboratory ingredients will not; hence there is no denying the responsiveness of all kinds of matter to chemical action. Where heat, as a product of chemical action, is not sufficient or appropriate to effect dissociation or combination, electricity is. Electricity is as surely a product of the repulsions and

attractions or chemism of matter as heat, and so are any and all other natural causes and effects. Dynamite and other explosives ought to give us a little idea of what the power of matter is under proper conditions. All the laws of nature and nature itself are contained and expressed in matter and motion. All the differences are differences in the mode of motion. This key to the mysteries of nature being once acknowledged will make clear many things now in an inextricable chaos.

We have now the theory of electrons recently launched out and already widely accepted. The particulars of it, being known, need not be detailed here. It is an advance upon former theories anyway by the fact that the division of atoms of matter is acknowledged or admitted, but the proposition that "immaterial atoms of electricity or electrons," occupy the same space as the particles or divisional units of atoms of matter—radiant matter—would express nothing conceivable but words, if it were not for the fact that electricity consists of motion, which is really immaterial. All accomplished motion is an immaterial entity, but it does not occupy any space. The sum total of all the accomplished motion of the universe can be lodged into the space of an atom of matter with the

atom besides. What requires room is motion taking place, but that does not constitute "atoms." The only thing conceivable that may, must and does occupy the same space as a particle of matter and its range of attraction and repulsion is the space itself; so it is, of course, with all matter. Electricity is clearly immaterial in itself, for we can create electricity out of magnetism as we can create heat out of cold, but **we can not create matter**; neither can we destroy it. Consequently, radiant matter or particles of atoms are not the electricity itself. The potential electricity contained in a cell or battery, even a storage battery, has no more existence as electricity proper before it is generated than the potential heat contained in a piece of coal has existence as heat before combustion. In both cases when the essential ingredients of combustion or one of them is exhausted further supply of heat or electricity stops. The meaning is obvious. The combustion or chemical change does not and cannot create anything besides motion, while the motion is essential to produce the chemical effect. Then, that very motion is the heat or the electricity as the case may be. If electricity is motion when produced one way it must be motion as well when produced in any other way.

When you have rubbed a piece of sealing wax or of amber or glass on your coat sleeve you have manufactured electricity through the energy in your muscles, but you did not create matter, did you? The electricity did not exist in the rubbing parts either before the friction, for it would have shown before as well as after the friction and the friction would have nothing to do with it, while it has all to do. It should have shown as well before the friction if outside the rubbing parts; therefore it was created necessarily. To rational understanding the only thing conceivable that can have been created is motion. These are simple, self evident facts,though they have to be pointed out to become so.

The caloric or electric motion being once imparted to the particles of matter in the act of combustion or otherwise would continue indefinitely if not transmitted to other matter, but by contact or proximity with colder or less electrified matter adapted to absorb the motion, the heat is bound to be more or less gradually transformed into cold and the electricity into magnetism. There are no perfect insulators for either heat or electricity and the leakage of either increases with its intensity.

What makes the forces correlated is that they all

represent motion and that motion of one kind can be transformed into another kind, indirectly by mechanism if not directly in the identical particles of matter.

The creation of magnetism and cold may be a destruction of motion, but more probably a reduction of its amplitude or speed, which is really a destruction of a part of the motion, or a change of some kind in the motion anyway, such as a change of form, all of which changes may be included and not necessarily always identical. Thus we have natural cold, machine produced cold, and the cold representing vegetable growth. Where the effects are different the causes must have some difference.

Another claim concerning the so-called electrons is that electricity is the base of all and that matter itself is composed of electricity. This looks like transposing puzzles or making three out of two. Apart from that the proposition is evidently untenable anyway. Now, something is the base of nature, but if we don't know what matter is we would remain quite as much in the dark and even more so if we assume that it is made of electricity, for that would not tell us what electricity is or what matter is in its essence for that fact. Or if we assume that matter and electricity are one and the same thing, that would be only giving

two names to that thing. The same thing cannot be material and immaterial at the same time or at any time successively, even if absolute destruction or creation is admitted in the case, for absolute or primary creation would be made out of nothing and absolute destruction would leave nothing. The only secondary immaterial creation conceivable is motion, and motion is inconceivable without matter. Therefore, if matter has ever been created it is it that represents primary creation, while it creates motion which is secondary creation. If electricity is not motion then it must be matter, whatever its state may be. We can say as much of any other immaterial entity, such as heat, cold, magnetism or light. Even the highest attributes, such as life and intellect or spirit would not have to be excluded. All would be matter. The very fact that electricity acts upon matter is proof enough that it is itself derived from matter and that its actions and effects are chemical in their nature. In these regards it is evidently comparable to heat, both in action and derivation. Nobody that I know ever claimed in modern times that heat is not an attribute of matter or that matter is composed of heat. There is, therefore, no more reason to make either claim for electricity than for heat. Further refutation is believed un-

necessary. In consequence of which we must leave matter remain the base of the universe, whether it is in a visible or invisible, tangible or intangible state or condition.

Still another claim made for matter (or electricity) is that the mind is actually made of it. Matter of any kind is unstable in any of its states, known or unknown, because it is ever susceptible of being acted upon by other matter and its condition thereby changed. Hence if the mind were made of matter as assumed by some investigators, the mind would be perishable; no permanent ego could exist, since if made out of matter it could be acted upon by other matter either in the same or a different state and thereby destroyed; death would be true and absolute and the universe purposeless.

PART III.

Life and Spirit. The Infinite. Immortality.

I.

Like every other manifestation of nature, all life is motion derived from the chemism of matter. Life appears to be a chemical function of matter where complexity of organism and of consequent motion taking place through it goes to make for intellect. The final inner expression of this motion would no doubt reside in the convolutions of the brain. Their number or intricacy and not necessarily the mass of brain matter would correspond to the degree of intellect in all animal species, and would have many different bents according to the peculiar disposition of the convolutions, and these would also correspond to and be dependent upon the other structures of the body; so that a strong, good health and the amount of vitality would be an important factor for the full development of the intellectual faculties attainable by the subject.

Sensations of pleasure, pain, feeling of any kind,

smell, taste, sight, are all sensations of motion, probably both from the body and from matter independent of the body, each sense supplementing what is deficient in the others. For this reason the greatest pain or enjoyment may be attained only when all the senses are concerned, but sufficiently increased acuteness of anyone of the senses could adapt it to convey the impressions or knowledge conveyed by all.

Up to this point at least we may assume that what moves is matter. Beyond that we might leave it to conjecture. Still, the mysteries of matter in a highly attenuated condition are likely to extend throughout the spiritual domain in the form of motion. The "aura" or astral body of the spiritualists would answer this description. Every living organism, animal or vegetable, would have its astral body which would be the product of its life. It may be remarked here that certain alleged spirit messages state that the spirit comes from the atom but do not explain how.

The repulsions and attractions of matter being ever reversible, it follows that the amount of motion which in the infinity of time can be and must be derived from them is infinity, even if the amount of matter in the universe were a finite quantity. Now if motion in itself were something transformable into something

else, either dependently or independently from matter —that ought to be good material for spirit making. Indeed it is not at all inadmissible that a spirit represents accumulated motion, which nature provides ad infinitum, as we will see later. Transforming one form of motion into another form, such as electricity into heat or heat into electricity does not change the name, which remains motion, although the properties are different but a spirit could also be a form of organized motion derived from life and of which matter in an unknown state would still be the base. The attitude of science on the subject of spiritualism and spirit communication tends naturally to retard its progress as it does on many other lines of knowledge, yet these are mysteries which appear to be within the range of man to investigate, not merely in the abstract or as a matter of faith, but in a practical way, and their apprehension, even if partial, is the highest attainment the human mind may long for.

If man ever succeeds in grasping some of the higher mysteries of nature, it can be only through intercommunication with the world of spirits.

The amount of evidence of spirit life and return is too vast to be dismissed as mere fable by the well informed, but it is not by assisting at a "seance" with a

spirit of skepticism and the purpose to deride what is seen or heard that one may gather much information; it is by consulting the abundant literature on the subject, principally the best.

The following is from the Scientific American, Supplement of March 28, 1896, first published in the Arena:

DE ROCHAS' EXPERIMENTS ON HYPNOTISM.

Few of our modern attempts to solve scientifically the great mystery of life have led us to more astonishing results than the discoveries made recently in Paris by Col. A. De Rochas, the well known scientist and director of the Ecole Polytechnique, concerning the "luminous effluvia," or magnetic emanations, from the bodies of living men. For the benefit of such readers as may not be familiar with previous discoveries, the knowledge of which is necessary in order to understand the recent investigations of Col. De Rochas, I must translate first here some statements of a celebrated Austrian chemist, the Baron von Reichenbach, who was the first scientist, over forty years ago, who discovered the "luminous effluvia," or phosphorescent-like emanations from animals, plants and magnets.

Here are Reichenbach's own words ("Lettres Odiques et Magnetiques," Stuttgart, 1856):

"Take a 'sensitive' man and put him in a dark room. Take along a cat, a bird, a butterfly, if you have one, or only some flower-pots. After a few hours of such a sitting in the dark, you will hear that man say some very strange things. The flowerpots will appear to him in the darkness and become perceptible. At first they will appear as a gray cloud on a black background, then he will see some lighter spots; finally each flower will become distinct, and all forms will appear more and more clearly. Your cat, your bird, your butterfly, will all appear thus in the dark, and some parts of these animals will appear luminous. Then your sensitive man will tell you that he sees you. Tell him to look at your hands. At first he will say that he sees a gray smoke: then the fingers will appear with their own light. He will see a luminous protuberance at each finger, sometimes as long as the finger itself. You will then probably hear him say with much surprise that the colors of the light are not the same in all parts of the body; that the right hand shows a blue light, and the left hand a yellow-reddish light; that the same difference appears at your feet; and also that all the right side of your body and face

is bluish and darker than the left side, which is yellow-reddish and much lighter." (Letter 5.)

Reischenbach found something else. He discovered that under similar conditions in a dark room a magnet emits a blue light at its north pole and a yellow-reddish light at the south pole. This light varied, according to the strength of the magnet and the sensitiveness of the seer, from one to three feet in diameter. It appeared like a fiery flow intermingled with sparks. Reichenbach's experiments were repeated in England by Alfred Russell Wallace, Gregory, and other prominent naturalists, and were fully confirmed. It is only recently that Reichenbach's discovery was taken out of oblivion by Dr. Durville, Dr. Luys, and Col. De Rochas, with what extraordinary results we shall now see.

Col. De Rochas hypnotized at different stages two different subjects at the same time and in the same room. Let us call them A and B. A reported that he could see a luminous or phosphorescent coating on B's body; he could see besides that B's eyes, mouth, ears, nostrils and finger ends were emitting a flamelike light, blue on one side of the body, yellow-reddish on the other. A common glass of water being brought, it was put within the radius of B's luminous effluvia as de-

scribed by A, who could see how far they reached. After a few minutes A reports that the water itself has become luminous, and that it remains luminous for a long while, even if removed to the other end of the room out of reach of B's effluvia. B's sensitiveness of the skin has been made to disappear by the hypnotic process; but any touch or puncture of a pin or needle on the outside edge of the phosphorescent or luminous coating perceived by A's eyes is immediately perceived by B. His body does not feel the sharpness of the needle, but the outer edge of his luninous effluvia, several feet away from the skin, has acquired that sensitiveness lost by the body. And here appears a wonderful fact. The water in the tumbler removed to the end of the room has acquired that same sensitiveness. If you pinch the water with your fingers or touch it with a pin, B will scream that you pinch him or prick him with a pin. But B will not feel the action if performed by a person who has no magnetic relation to him; in other words, the action of the magnetizer alone will be felt in the water by the subject.

Let us examine now more closely and with more details this strange transfer of the sensitiveness of our nerves to inert objects, which Col. De Rochas calls the "exteriorization of sensitiveness." A's eyes have been

brought up by hypnotic process to a state which allows him to see the "luminous effluvia." But what he sees and describes varies a great deal according to the grade of hypnotic sleep in which B is being plunged.

When B is awake and in his normal state, A describes the "effluvia" as a luminous coating on the skin; but as soon as B loses his sensitiveness under the action of mesmerism, the coating seems to dissolve itself in the atmosphere. Then it reappears like a light mist or smoke, which condenses itself and becomes brighter and brighter, till it takes again the appearance of a thin coating of light following all the forms of the body at a distance of about an inch from the skin. B feels then every touch of the magnetizer on the surface of that coating.

If you continue the hypnotizing process on B, A will see, around B's body, several new luminous coatings separated one from the other by a space of about two inches. The sensitiveness of B exists then only on these coatings of light, and seems to be in inverse ratio to their distance from the skin. These coatings will extend from six to nine feet from the body. They will go through a wall, not being stopped by masonry and they will appear in the next room through the wall. Now if we make a small statuette or figure of

common moulding wax and place it awhile in the "luminous effluvia" of B, then withdraw it and prick it with a pin, B will feel the puncture of the pin at the corresponding part of his body. If you cut a lock of his hair during his sleep without his knowledge, then plant that lock of hair on the wax figure and pull it slightly, B exclaims suddenly, "Who is pulling my hair?" The same results are obtained if you try the experiment with the whiskers or beard, or even sometimes with the trimming of a finger nail. Generally in most cases reported by Col. De Rochas the sensitiveness did not extend over 15 or 20 feet from the body of the subject, but there were exceptions.

The sensitiveness was then transmitted to a photographic image of the subject by leaving the plate for some time before using it in the "effluvia" of the subject. Here in several instances the plate retained the sensitiveness of the latter for several days. But unless the sensitiveness of the subject has been exteriorized (transferred from the skin to the "effluvia") before the photograph is taken, and unless the plate has been well impregnated in the "effluvia," the sensitiveness does not exist. Col. De Rochas tells us that he made the following experiment on Mme. O———. He used generally the palm of his right hand to hypnotize her;

he had a life-size photograph of the palm of that hand taken. Mme. O——— was awake and sitting on a chair, not knowing what was going on in the room. Then one of the assistants, being concealed behind a screen, presented the plate on which the hand of Col. De Rochas was photographed to the plate on which the image of Mme. O——— had been previously taken. At the instant when the gentleman opposed the two plates to each other, Mme. O——— stopped her talk and fell asleep on the chair. Then Col. De Rochas walked behind the screen and woke up Mme. O——— by simply blowing on her image.

The sense of touch or feeling seemed to be the only one exteriorized. It should also be observed that all these experiments succeeded only with persons whose sensitiveness was either naturally very great or whose sensitiveness became developed by practice. Thus, this wonderful "exteriorization" and transfer of a man's sense of feeling to inanimate objects opens now a vast field for new investigations. It shows, in the first place, what enormous physical influence on health and disease the luminous effluvia of a human being can exert. Then again this transfer of sensitiveness to inert objects throws a most interesting light on the dark and obscure practices of sorcerers and witches in

the middle ages. Our forefathers believed in the faculty of hurting an enemy under peculiar conditions prescribed by sorcerers, by transferring to him a disease or by stinging his image duly prepared for the purpose. Then again these facts recently discovered in Paris by De Rochas and others, who followed and repeated his experiments, shows conclusively—in the writer's opinion, at least—that the common scientific theory based on our present knowledge of matter by which we have tried to explain man's nature is absurd.

Now what are the luminous coatings of the effluvia consisting of? Each coating must represent something different either in kind or in degree. It is hardly admissible that they belong to or are integral parts inseparable from the mortal body. Yet that which can be seen by a hypnotized person must be still material enough to impress his or her sense of sight. It is therefore presumable that the luminous effluvia is the astral body of spiritualism, but that would not yet be the spirit proper, although it would follow it at the death of the body. We see further that the sense of feeling can be removed from the body and not destroyed, even momentarily.

It tends to reincorporate in the human form, such as in a wax figure or in water and impresses itself on the human image. If only the sense of feeling has been removed from the body at the command of the operator, we should not expect the other senses to be exteriorized, but it is very likely that every and all the senses can be exteriorized, including even the faculty of speech.

In conclusion, the universe as we see and conceive it, with all its physical effects, is the outcome of the selective vibratory motion of the individual particle of matter. But this only opens new fields of inquiry which broaden more and more. We still remain at the threshold of the wondrous mysteries of Nature. There can be little doubt that man in his whole is a product of Nature like any other living being, but since Nature creates beings who can understand part of her work, these same beings must be adapted to reach a stage of existence where everything will be understood, including the Infinite.

The supposition that man represents the highest order of beings in existence which would be the product of a blind Nature, while this very Nature, of which man is a mere product, is governed by laws which his intellect cannot even grasp or discover, very much

less destroy or create, is positively ridiculous, yet that is the contention of many men who are utterly at a loss to explain the mystery of their own existence, of which no one has ever been the author.

If the first man or intellectual being was ever created direct, it is not likely to have been in this little world of ours, but it might have been on some one of the countless worlds of Infinity now long extinct. All his descendants, past and future, on all the worlds would have been virtually created at the same time by the property given to matter of generating life and continuing the work of creation. If the properties of matter were taken off from it the universe would be dead, inert and motionless at the some moment.

The idea of the direct creation of man and of any other organic being, however, is apparently a myth born of ignorance, as it is the negation of the doctrine of evolution. The fact is that if creation has ever been commenced, in any event it is not at all finished; it is going right on now and the work is done by matter, which is the one thing whose creation, if created, is probably finished. It is not only the creation of individual organic being that is going on, but continual progressive changes are taking place throughout all the worlds of the Infinite, where some are growing

and others dying, but matter never dies, and from it new worlds spring into existence from the ashes of the dead ones through the aeons of endless time.

II.

Most of us think we understand what is Time, Space and Number, the three branches of Infinity.

May be we understand as much of it as we are to it—practically zero. We usually refer to Number as a number of material things or objects, but its relation to Infinity is the divisibility of infinite Time and Space into infinite Number of units.

If no matter at all existed, or had ever existed, infinity of void Space containing an infinity of points within it would have still existed in the infinity of Time past and would continue to exist for Eternity. We understand that much that it must be so, because it is absolutely past comprehension how it could be otherwise. No matter how remote a boundary we may imagine for Time, Space and Number, there can be no boundary, for, what would make the boundary? What would be behind or past it? Time, Space and

Number ever, ever, ever! No sophistry can get rid of that as far as human comprehension is concerned. But furthermore there is necessarily an infinity of infinities, each different in degree, yet each representing Infinity.

If we suppose an infinite number of bodies moving through space in a straight line, we may for illustration start from a body employing millions of years to move one inch and stop at one moving millions of times faster than light, with bodies moving at all intermediate speeds between these two extremes, all of them could move in a straight line in any direction for all Eternity without ever encountering an end to Space, for assuming a limit in one case would necessarily imply a limit in all cases. This means that no matter into what number of parts we might try to divide Infinity, every part would still represent Infinity as well as the whole, and if divided by Infinity itself, every part would still remain Infinity.

If we try to imagine a space as many times as large as the visible universe as there are atoms of matter within it, up to and including all the faintest stars recorded by photography, would this give us the faintest idea of Infinity? That would be a mere point within it. That and the space of one of the atoms

would make little difference for Infinite Space; so with Time and Number.

Then before such a transcendent mystery may we not venture the question: Is not Infinity God Himself? It is at least the nearest or rather unique conceipt we can have of the apparent entity of a Pure Spirit—one whose existence we actually perceive as absolute fact, though absolutely independent from matter—and who is infinite.

If the Infinite is not God, it would be a thing as great as Himself in incommensurability of extent, in immutability, in inconceivability, and apparently not created by Him; or, unlike matter and motion, would be uncreatable and uncreated as far as human reason goes, and the purpose of human reason is evidently to distinguish truth from error. If God created the universe He did not intend to make of it a lunatic asylum, (though men do sometimes, but of course, dear reader, it is neither you nor I).

Thus while we can not possibly apprehend the limitless extent of Time, Space and Number, still we understand that they are necessarily limitless, and that they are unborn, uncreated, because immaterial and ever independent from matter.

Motion in itself is also immaterial, but it is born

from matter since it is matter that moves. If motion continues to exist as an entity independently from matter after it has been created by it, that would be pure spirit, too, but it would not be infinite, and could be multiplied in number of distinct entities ad infinitum, while infinity of Time, Space and Number remains continuous unity; no part can be detached from the whole or its position changed.

Are we sure to understand what are Time, Space and Number in their essence? For instance, the prodigious feats of lightning mental calculators, performed without any written figures to the amazement of professional mathematicians, show that a few exceptional minds can deal in numbers independently of mathematical processes and figures. It is distinctly a special gift that the possessors themselves are unable to explain. Some of them claim that even the sight of written figures disturb them in their calculations and problems given them to solve must be given in spoken words.

Such persons as a rule have no special memory except for numbers. Such special faculty, like all special faculties, must be assumed to represent different embodiments approaching Divine Essence in various degrees.

Would God have made a thing as great as Himself which would be patent to all, while He, Himself, would not be except by inference? Time, Space and Number as the embodiment of the Infinite fill very well the description of one God in three persons: Father, Son and Holy-Ghost. They are the only conceivable entities that do so.

The resemblance of man or of any intellectual being to God would not be in the form of his body which may depend upon circumstances or conditions, but in his spiritual nature, more or less independent from matter; so that humanity or spirit creation would embrace all the worlds of Infinity.

Time, Space and Number are three distinct entities, yet each one contains the other two, and none can be conceived of without embracing all. Thus, the idea of time can not be conceived without embracing space and number; nor that of space without embracing time and number, or that of number without embracing space and time, even in a limited sense; that is, without embracing the Infinite. The three entities are inseparable, in the unit as in the Infinite. If we think of the space occupied by an atom of matter, but leaving aside the atom to think only of the space occupied by it, and consider this a unit of space, it will

be also the unit of number, but it may not be the unit of time, for the latter will be related to Eternity. On the other hand if we think of a unit of time, say one second, it will also be the unit of number, but will extend throughout infinite space. Again, if we think of the unit of number, that can be figured only within time and space as a unit of both, with or without matter. Multiples are similarly correlated.

Was the doctrine of the Holy Trinity founded upon or born from this analogy, or is it itself the Holy Trinity? Being unaware whether this question was ever propounded before, it is propounded here in any event.

The universe is manifestly made up of spirit and matter. Whatever is not material is necessarily spiritual in its nature, or what else would it be? Inert matter would remain inert, lifeless and motionless. Matter is the thing we see with mortal eyes, but if matter were "inert" it would have to be animated by something else for producing all the phenomena we behold. That something could not be material and immaterial at the same time; then if not material it would have to be spiritual. On the other hand if the "something else" is contained by matter itself, then matter is not inert; it is alive, and if alive it contains

a spiritual essence; this spiritual essence is immaterial and manifests itself by motion.

Then motion must be spiritual and the essence of intellect and individual spirits; and if motion in itself remains an entity after it has been created, it is still more apparent that Time, Space and Number are entities in themselves, so much so that they contain the mystery of mysteries.

III.

Undoubtedly no matter is ever destroyed, but it is not only the material that is indestructible. The forces of nature though immaterial can be transformed but not destroyed. These forces are ever extant, consequently ever active, and the product of this activity—motion—must be as indestructible as the forces themselves, for although no force can be transformed into motion, motion or momentum as the product of energy, can be convèrted back into energy or contains energy in itself. What becomes of all the energy represented by permanent, universal motion, from the motion of atoms to that of solar systems? An outlet for

it is indispensable. What else but spirit life can provide the outlet? None better or as good is in sight. Nothing whatever can occur in nature that does not represent motion of some kind and as such it is an entity though immaterial.

The spiritual quality of the immaterial may and must be more or less refined and is consequently subject to evolution. Indeed it is only the spiritual that is susceptible of evolution, for material forms of animate beings are simply the expression of and conform to the spiritual condition of the spirit which inhabit them. When the flow of vitality is broken the matter of the form is left behind and it disintegrates to enter into new activities, but there is no evolution of the matter itself, and the evolution of the form represents the evolution of the spirit which constitutes the real imperishable entity.

Considering that immaterial born entities must necessarily be represented by motion, their evolution should always mean improvement and would be the result of modifications in the aggregate sum of motion of the individual.

Any kind of knowledge is imparted or transmitted from one mind to another through motion in the same way that combustion is started by the peculiar motion

or impulse imparted to some particles of fuel. Conventional signs or figures whose conventional value or significance is known and fixed in the mind is one of the means to impart the motion which conveys the knowledge through one of the senses, usually that of sight.

Any and all phenomena or occurrence being necessarily produced by motion as we have seen before, when a phenomenon is directly witnessed by one mind the motion producing the phenomenon imparts a certain motion within that mind and this motion is an entity which remains in the mind as knowledge which can be transmitted to other minds. The motion would no doubt take place in the luminous effluvia and not in the grosser matter of the body, though in many if not all cases the latter would also be affected indirectly if not directly.

Thus it has been demonstrated experimentally by means of a specially constructed and very delicate scale that thought directed to a part of the body sends blood thither. This being the case, thought must invariably produce some blood motion whether the thought is of the body or of anything else.

It has been and must be assumed,however, that the matter of the luminous effluvia is not the mind or spirit

itself, but would be the vehicle through which impressions would be conveyed to it.

The will of the spirit proper would also impart the required motion corresponding to the will.

Since everything that occurs in nature must be produced by motion, everything is governed by mechanical laws—the natural mechanism of matter, arising from its properties of attraction and repulsion.

Events, good, bad or indifferent, being merely the culmination of motions, if we deny a quality to the motions producing events, we should deny a quality to the events themselves.

Or in other words, what is not an entity in itself could have no quality. Thus if the act of murder, for instance, is not an entity in itself, it could be neither good nor bad. Any act in itself is not material; neither is its quality, but it is not the less an entity. All that occurs in nature being immaterial, if we deny an entity to the events or to the motions making the events, we might as well deny an entity to heat, for heat itself is motion, which cannot be destroyed without leaving an opposite force in the matter containing it.

If you doubt that heat is motion—atomic motion—and that as such this motion is an entity in itself we will call your attention to another evidence still more

convincing that all motion is an entity in itself. Any body in motion represents kinetic energy, which is absorbed by further motion, and, therefore, if motion were nothing in itself **then energy would be nothing either.** Energy may be dissipated without doing appreciable work, but not without motion of the matter containing it, whether tangible or intangible, and we know also that it may remain indefinitely in a latent condition.

And again, all potential energy is clearly something in itself, although it is not energy in operation and is nothing material. It it were nothing after operation it would be nothing before, for after doing its equivalent of work which is embodied in motion, the energy has no more existence as such. It has been transformed into motion and that is the entity which remains after the energy is no more. Motion in any form is a creation from energy which is equivalent to energy itself.

Energy or motion is permanently generated by the transformations of the forces of matter; so that all energy can be said to be born out of nothing, but it is something when born since in fact energy or motion is everything besides matter. Obviously we can not say that human understanding is matter. Then it

must be motion of matter, or what else could it be? Full understanding must be one of the ultimate purposes of our being, and since our partial understanding is immaterial though created by matter, we may say that this so-called material world of ours is as much of a spiritual nature as the one beyond the grave, but both the matter and spirit involved are in a more rudimentary stage or grosser condition than in the world beyond, which is as natural as the one which gives us birth. It is apparently a link in the chain of evolution of the spirit.

Motion being creation and all creation the product of motion, for that fact alone it is preposterous to suppose that our little planet is the only one inhabited when all the celestial bodies are in rapid motion. No better proof of the plurality of worlds should be required.

IV.

Unless it can be shown that all the motions, including all life, intellect and events in this world are nothing which come from nothing and go back to nothing, they must proceed beyond, for if they are something they can not be destroyed naturally.

But if they were nothing they could not come and go, they would stay nothing, **while their coming is a spiritual creation—the only kind of creation we can perceive in nature,** since it does not appear that any more matter besides that which actually exists is ever created.

Think well if you please and see if this is not simply a plain truism. I invite the world, the whole world, both scientific and unscientific to think deeply on this subject and find out whether there is anything whatsoever in nature, any phenomenon, property, cause, effect or quality that is not an embodiment and an expression or a potentiality of motion of some kind, and whether any such thing can be conceived or defined, knowing as we do that thought itself is mechanical in its original creation, since its disturbing influences upon the natural movements or circulation of the blood is a practically demonstrated fact.

To the materialist and the scientific exponent of ologies I would ask: Did you ever stop to think and consider that the matter of your body—the only thing about you that can be seen by mortal eyes—is not you, does not intrinsically belong to or form integral part of yourself. That matter was in existence before you were born and will continue to exist after your

so-called death without the least change whatever in any of its innate properties. Therefore you take nothing from it and add nothing to it besides motion, even during your life in the body. Not a single atom of matter did your life originate or will ever create. Besides the matter of your body is continually changing, i. e., it is being gradually and continuously eliminated and renewed. This is nothing new. One portion of the matter forming an integral part of your body ten years ago may be now forming part of other human bodies; another part may be in the flowers you admire, and still another you may again absorb through your food and respiration, while the greater part has entered into one thousand and one other functions or remains in temporary repose. So, the matter of your body is undergoing continual change, but you always remain the same person. The consideration of that fact alone should dispose of and completely disprove the future resurrection of the body as contended by the religionists. Considering that certain parts of the body are renewed a great deal faster or oftener than others, if all this matter having at any one time formed integral part of our body were to be incorporated in it and resurrected, then, man after resurrection would have a monster body of monstrous shape, bearing no

resemblance with the present human form. Furthermore, the same matter could not be definitely incorporated in the body of several persons at the same time, though it may have been so incorporated successively and temporarily. Hence, man's body is no part of his ego. He is made out of or rather by dust though, but the dust itself does not enter into his lasting personality, for the dust remains dust, before, after, and always.

Then, if anything at all has been created in you, what is it? If nothing has been created what is it that thinks and reasons? Since it can not be matter it must be an immaterial entity. If such an entity had not been created in you, is it the matter of your body by itself that would live, act, think and conceive, only to drop such faculties at death time, sending them back into nothingness? If you be nothing after death, then you are nothing now, for your living only brings about a momentary change in the state or condition of the matter forming your body. This momentary change in the state of matter represents either something or nothing by itself; it can not be momentarily something and then nothing; this would be contrary and against all the laws of nature, involving the final annihilation of their purpose and creations, only to

bring generation after generation of ignorant creatures, guessing and wondering at their marvels and then vanish.

The effect of the continuous integration and disintegration of matter in your body is not merely that of keeping you alive with a determined, invariable amount of knowledge and experience, for every day increases your fund of both and all remains with you, though you may not know or remember it, while the amount of matter in your body does not increase after maturity, or if it does you are not wiser on that account. Then, what is all this ever increasing store of knowledge and experience made of, since the amount and identity of the matter in your body are independent factors which have nothing to do with it? After a long illness you may remain with only skin and bones, but so long as your mind is clear it is not affected by the loss of weight; recuperation with new matter leaves it intact. You remember events and actions you did at a time when none of the matter at present forming your body was a part of it. When one or both of a man's legs or arms, or even both legs and arms, are amputated he does not lose any part of his wisdom or knowledge thereby. Not an iota of his ego. Yet his amputated limbs are dead. His body is no longer

entire, but he feels his personality entire as before. Nay, he even feels as if he had still his missing limbs, and he has them, too, but in an invisible condition. They could probably be seen by a person in a deep hypnotic trance. He still possesses all his intellectual faculties as if nothing had happened; yet if his personality resided in the matter of his body he ought to find his intellect short of something as well as his body. One thing would be inseparable from the other; or rather, there would be only one thing, hence that one thing could not be separated from itself, but only divided into parts. Should you choose to call his personality "life in matter," the amputation of his limbs would remove that part of his personality, for the various parts of his individuality would follow the corresponding parts of his body, since they would be one and the same thing. Even parts of the brain, it is said, have been removed without apparent inconveniece.

If you deny that you are a spirit **now**, you simply deny your existence, but that does not destroy it; nothing can destroy it. Dissolution of your whole body does not destroy you any more than the dissolution of a part of it does any part of you. This is a fact rationally demonstrable on a true scientific base without any occult manifestation. The final separation of the spirit

from the gross body is only a change of condition, an evolutionary process. We may, therefore, expect to find the conditions of living after the so-called death quite as natural as we find them now, though different. And why should it be otherwise, please? If we are of a spiritual nature after death we are of a spiritual nature now. Our present alliance with and derivation from gross matter does not alter the essence of our being, which ought to be at least as spiritual as the forces of Nature; neither will its separation. The laboratory man expects to find everything in his experiments on matter, or at the end of a scalpel, but only through the laboratory of the mind can he expect to grasp a few of the higher truths. So long as he does not look deeply into his inner self, he is like the blind, burrowing mole, which never can see the light by burrowing underground.

Nothing is the negation of existence, and what is non-existent or unborn cannot be felt, cannot be conceived, for any concept once produced in the mind is a creation, an entity in itself. An original concept or knowledge first born in one mind, when conveyed to other minds represents a multiplication of the original creation. This may be compared allegorically to the lighting of a match by friction where the lighting is

transmitted to any number of matches without friction.

Caloric combustion may be again referred to for illustration of the existence of immaterial entities represented by motion. Combustion is a chemical action whose effect is heat and heat is a physical effect derived from the molecular motion producing combustion; so that motion is here turned into an entity which, though immaterial, can be felt and the fact that it produces innumerable effects, can be felt and transmitted, though not seen is the conclusive proof that it is an entity in itself. Consequently any motion, whether visible or not and whatever its speed or form may be, is not the less an entity in itself. The simple fact of moving any object from one point to another involves various motions which did not exist before they took place. Said motions, when once accomplished, are imperishable entities which may have no consequence at all, or may be of the gravest import, creating other entities, such as throwing a lighted coal into a powder magazine. All that occurs for good or evil is only motion of matter, but matter is directed to act by immaterial causes derived from its own properties, and motion of any kind ever means immaterial creation which cannot be undone, but only compen-

sated for by opposite creation. All thoughts and actions being also creations, every intellectual being is free to build up his own personality in whatever way he pleases, and, "as a man thinketh in his heart so is he."

Matter is never more alive at one time than at another, though it may be alternately in temporary activity and in temporary repose. When combined in certain ways, forms, kinds and proportions, so as to form a working mechanism or combination, and the spark of life is started, a multiplicity of motions is evolved in which matter is consumed, or rather changed in condition, and the combustion continues just as in a lighted lamp. What we call life is organic combustion. All the motions derived from this combustion give birth to a growing entity represented by the sum of all the motions combined. This entity gradually evolves and directs other sets of motions consisting of thoughts and actions. It is the building up of the spirit—the real ego.

We may therefore say again that nothing is lost in Nature and that man's thoughts and actions are entities which will follow him as his heritage and part of himself. Indeed, it looks as if they were constituting his entire personality. His knowledge and beliefs

must be considered as factors, but his thoughts and actions are largely influenced by his knowledge and beliefs, while the latter are largely, if not entirely born of former thoughts and actions. One most convincing reason if there were no others for holding that this is the Law of the Great Cause is that it ought to be so for absolute justice to all, so that every one may be what he is of his own making and carry with himself his own reward.

Furthermore, man, mind, spirit or whichever name our real personality may be called is clearly and necessarily made up of motion, since motion is the only thing that can be created out of matter and no matter can be created or destroyed. Beside, the matter whose motion makes our personality is merely transitory through us during our life in the body, and here is the secret of life and being.

What is the spark of life? Of what is it made? It is simply the spark or start of motion of a definite kind, because it can be nothing else, because there is nothing else conceivable out of which it can be made. It is analogous to the spark of fire, in that both are derived from and maintained by motion. Energy is expended in starting it, no matter how minute the quantity, therefore the spark is imparted from an ex-

ternal source. It may start spontaneously when the necessary elements to a definite form of life are brought together, but they have to be brought together and Nature takes care of that. Once started, the motion continues of itself by chemical process, provided the elements necessary to a definite form of life are present and the conditions favorable. It is all a question of chemistry, chemical mechanism and a starting of that mechanism into a building up motion, with the proper feed. Of its own accord matter goes on building up organic life and growth as it builds a consuming fire. Out of the motion independent intelligence and spirit are born.

The human body is a sample of Nature's mechanics. It is provided with levers, pipes, coils, valves, strainers, chambers, channels, return channels, stiff rods, flexible rods, diaphragms, whistles, gauges, alarms of all kinds, and a multitudinous paraphernalia whose mode of action is not even guessed. It contains all the principles of man's mechanics and many others not yet discovered by man. The whole intricate mechanism plays harmoniously, is self-acting, self-regulating, self-repairing, automatic, contains provisions for all disorders the occupant of the machine brings about, but often the latter is the stronger and

the machine being too abused gets out of order after all. For ages to come the greatest mechanicians and inventors may discover in the human anatomy most interesting lessons in mechanics. Now, our friends the materialists want us to understand that all this goes for naught and that their wisdom is superior to everything else, that blind matter does all and combines all this together chemically and mechanically because it does it and that this is all there is to it; that all this calls for no wisdom coming from nowhere, or that it is the own independent wisdom of matter itself. Permit me to suggest then that matter is infinitely more wise than you and I.

Everything in Nature is adapted to promote the pleasure, enjoyment and happiness of mankind when intelligently made use of. Everything can also do the opposite when wrongly employed or directed. Fire, for instance, can reduce to ashes a whole forest, a whole city. Should fire be condemned and abolished on that account? It could not be abolished in the first place. Spontaneous combustion, for one thing, would cause it to make its appearance again and again and the great source of fire—the sun—could not be reached.

It behooves mankind to find the secrets of Nature

and their purposes, which are all for its benefit; when perverted, man has only himself or his ignorance to blame for the results, not the Author of Nature or Nature itself.

V.

This is not intended to be a treatise on morals or religion, but if we want to attempt to make at all deep sounding into the mysteries of Nature and the meaning of our being we cannot ignore the Supreme Power behind it. We may, however, take the ground that we know very little concerning religion except that such power is. The ingenuous legends of the sacred writings may contain some truths, but on the whole they can hardly be considered fully satisfactory to the expanding mind of man, because there are so many different creeds and teachings, and we have to rely wholly upon the writings and sayings of other men. This is hardly a reliable basis to stand on. If the Deity wanted us to **know** by revelation He could make thosuands of ways to let us know with absolute certainty, every one of us, independently of the sayings of others. We may therefore infer that what we don't

know it is better for us not to know at this time, but that should not prevent us trying to find out; on the contrary, it is the incentive that must lead us onward and forward, for problems of science and of religion are necessarily correlated and complementary to each other, so that neither can be considered satisfactory unless they coincide.

Sure enough no matter how natural anything may seem to us, Nature and its laws is one of two things: it is the work of a Supreme Being or the work of itself. The claim of science is that it is the work of itself and refuse to see or discuss anything else. We may let science reap the benefit, but will not follow it in this path. Notwithstanding all their materialism most scientific men are not quite prepared to proclaim that man is born and dies like mushrooms without any more hope of subsequent conscious existence. Yet they present us the most singular inconsistency in that, not only do they reject all current religious creeds for good reasons, but they are still more aggressive in denouncing as absurdities and rejecting all proofs of the existence of desincarnate spirits secured through their communication with men and all the supermundane manifestations so frequent in these days. Then if such scientists believe at all in a here-

after, it must be one of their own make, but they never told us yet how it looks. Which is the more absurd: believing in survival after death without any proof and denying that such proofs are possible, or entertaining the same belief on account of the proofs and willingness to consider and investigate them? Whenever any proof is offered, most scientists will resort to and readily admit all kind of coincidences and impossible combinations of circumstances rather than accept the very simplest explanation. This for them is an utter absurdity they cannot swallow.

The degree of education, however, is no necessary factor in the acceptance or negation of spiritual manifestations. We see strenuous negation among the grossly ignorant quite as strong as on scientific pinnacles, while we find equally fervent adherents from one extreme to the other. This is a very significant fact not to be overlooked by those seeking the truth, as is also the fact that the so-called enlightenment based on error is very much worse than plain ignorance.

If we want to know anything about actual post-mortem conditions we have to discover them as well as we have to make any invention or scientific discovery in any other line. The plea that such dis-

coveries cannot be made is idle, for the modern discoveries or rediscoveries about the powers of the mind, such as hypnotism, telepathy, clairvoyance, mind reading, etc., are leading there, and those who deride these matters are very short sighted indeed. The "exposers of spiritualism" assume many things. They assume that when they have exposed a fraud this settles the whole matter; that since there is fraud in this line everything is fraudulent.

If all that we can discover through exercise of the mind were revealed and explained to us by a more advanced order of beings, mankind would be robbed of its incentives for progress and the most ardent investigators would not be slow to complain that their endeavors are unnecessary and of no use and would naturally stop further inquiry. This is good enough explanation that we may not and should not expect direct revelations from the world of spirits concerning what we may find out by ourselves when we try long and hard enough. Spirits simply cannot give such reliable revelations and if they try they mislead us and themselves. There is abundant evidence of this fact, and as a rule, spirit communications are not to be trusted, unless in purely personal matters. Even then, there are all kinds and grades of spirits as there

are all kinds and grades of men, the good and the bad, the learned in truth and the ignorant or deluded. Even genuine mediums are often direct victims of misleading communications, and for that reason charged with fraud; but there are real frauds, too, and many of them.

There are many more reasons why we should not expect reliable information from the world of spirits concerning the conduct of human affairs or even concerning the conditions of the spirits themselves. If everybody were thoroughly convinced that real life does not stop at the so-called death and that the conditions of existence are at all better in the spirit world than in this, suicides would multiply alarmingly and this planet would gradually become depopulated; the progress of intellectual development would be neglected. That is not in the plan of the Infinite Wisdom. It would be rather uncomfortable if we could have no privacy or secrets which could not be revealed to others by unseen eyes. Secret processes, discoveries, inventions, business affairs, domestic relations of every individual would become public property; all private affairs of everybody would be an open book to everybody. Our liberty of action would be practically gone. Neither is that in the plan of the

Infinite Wisdom. If we could know with certainty beforehand everything that is to befall us everybody of course would be eager to know it, but that would be simply a permanent calamity, and if the foreseen events were to happen anyway we would be very clearly absolute slaves of destiny. This again is not in the plan of the Infinite Wisdom.

But for all that any one who will qualify himself may become able to shake hands with spirits and converse with them. That is a thing not infrequently done at the present day by adepts, yet relatively few people realize it, while the fact gains no credence at all in the world at large and is dubbed "fake." When you see a human form beside you, feeling the pressure of his hand, converse with him, and then see him gradually sinking through the floor still holding your hand as he bids you good-bye, until the hands melts in yours and the form vanishes notwithstanding your efforts to hold it, I should like the exposers of spiritualism to explain the trick.

We must realize that progression goes on on the other side as well as here, and that while death makes us enter a new sphere of action it does not suddenly lift the veil of ignorance in its entirety or to the same extent for all. This is frequently stated in spirit com-

munications, but if we are not prepared to accept such communications as genuine we must consider that the existence of the spirit after death, with the possibility of its momentary return, is a fact or it is a fancy; it is a capital truth or a capital lie with no alternative. It cannot be only a fraction of either or both, no matter what is our degree of belief or of doubt in either case. Therefore each one of us had better make up his mind to accept squarely the negation or the affirmation and say so fearlessly if he has investigated to his own satisfaction, for it seems that this matter ought to be of some little concern to everybody. For my part, I say most emphatically that there is superabundant evidence obtainable that it is a fact for those who really want to find out. Those hardened and blind scoffers of "spooks" had better hush if they have only their own negation and flippant language to offer as evidence. So far I have been unable to gather anything else from them.

In regard to spiritual manifestations we often hear the skeptic say, "Such and such are made of the same stuff as dreams are made of," thereby presuming to shut the door of argument with a bang. Very well. Then are you prepared to give us a clear and certain definition and explanation of what stuff dreams are

made? For they are made of something, be sure of that. If they were made of nothing you would not have occasion to mention them, for nothing is nothing and needs no other name or definition. There is no effect without cause or cause without effect and every effect is something. Besides, everything in nature is embraced within these two words, cause and effect. Everything that we understand as well as what we don't understand is immaterial; as to matter itself, we don't know what it is. Then what kind of stuff is all this world made of anyway; is it so much different from the stuff of dreams? The fact is that the real awakening is what we call the last sleep—death.

Can you tell us what kind of stuff your consciousness and understanding are made of? They are apparently made of the same stuff as dreams, too, or closely related, for it is your consciousness which is involved in dreams, not your body whose senses are all shut up, all asleep. Some of your dreams you never remember in your waking state, but some others make an impression on your mind strong enough for you to remember them. You see, you hear, you say and do things which for the time being are as real in your mind as if all occurred in your waking state. You understand what is told you and make yourself under-

stood, yet your material senses are not there. You find yourself in strange places, in strange lands or anywhere except where your body is as a rule. This you cannot do in your waking state. You can think of such places, but cannot be there in person independently of your body as in dreams. What you perceive in dreams may be all derived from yourself in most cases, that is granted: you may call it aberration or undirected activity of the inner mind, or whatever you like, but it shows that you can communicate with other beings, imaginary or real, independently of your material senses, and that they can communicate with you independently of theirs. It shows further that you can see immaterial beings not clothed with any gross material body, converse with them and get all impressions from them, not only human beings, but any immaterial object can be seen as well. This consideration is important, as the world beyond is said to be as natural as the one we are in. That which sees things when we are awake is not our body, but our body is the instrument through which things are seen in the waking state so long as we are bound to it.

But aside from dreams, telepathic communication between living persons is a well authenticated fact.

Because the faculty is exceptionally developed in a few persons only at the present time is no reason for denying it. Furthermore it can be developed and cultivated like mediumistic powers. The latter faculty is that of communicating with the departed and the former with the living and must be closely related if not quite identical.

That both are among human attributes can be denied only by those who prefer to keep their eyes shut. Though both faculties are relatively rare and still very crude, both are bound to develop further with the evolution of man.

The marvels incessantly wrought from the secrets of Nature in our time are only a prelude of what is to follow, and those who refuse to see behind it all a superhuman wisdom and power give evidence of possessing a very low scale of intellect, but usually presume to be the real smart ones. Progress has reached a stage where we must look for its further advance by leaps and bounds and the field is boundless. The timidly inclined must be set aside and left behind with their conservatism. It is not merely material achievements that are to be looked for. The spiritual attributes and powers of the mind and the spirituality of

Nature itself in the majesty of its works is to become more and more manifest to all as time advances.

Since matter and motion of matter are the entities out of which all conceivable entities are made, if we were to assume that matter itself is not spiritual, in any event, all its creations being necessarily embodied in motion are necessarily immaterial or spiritual; and since matter possesses this wonderful power of creating spiritual entities, it must be itself endowed with Divine Breath, even if the existence of the entities created by it were only momentary or temporary; but no product of Divine Breath can be perishable, unless according to foreordained Law; it is only transformable through evolution until perfection is reached. This is never attained on the terrestrial plane. What we call the laws of Nature are really the laws of the Author of Nature. The man of to-day who in his present condition could sleep for two hundred years and then awaken would imagine himself to have been transported into a real fairyland. By that time the human race will have improved one thousand per cent, physically, intellectually, morally, and spiritually. I venture this prediction because at this very day means are within the reach of man to accelerate this evolutionary process from generation

to generation. The power of mental action of the expectant mother upon the future personality of her unborn child is well recognized and abundantly proven, notwithstanding what may be said to the contrary by a class of short-sighted exponents of physiological functions. But I wish to mention another no less important power for good, which, in connection with the former, will transform the human family. It is the power of post-hypnotic suggestion to be given the expectant mother for the benefit of her offspring. Hypnotism is God's power placed in man's hands for his benefit. It is a revelation and a promise giving us the first glimpse of the future spiritual powers and unfoldment of man, even in this material world. Don't trifle with it. Man has been given the laws of Nature to master and to use for his benefit. Out of these laws he can accomplish whatever he sets his mind to achieve, for they are all powerful. Wondrous things without end and still undreamed of may confidently be predicted. Mankind has just entered a new era in its evolution and what is considered supernatural, and for that reason ignored by science, only points the way to higher entertainments.

VI.

Many people persistently refuse to look or see anything concerning man beyond the span of human life in the body. This is the general attitude of science up to the present day, though a change commences to be noticeable in some quarters. For them there is no manifestation that cannot be accounted for from natural causes and laws amenable to scientific explanation. In this they are probably right in one sense, and up to a certain point, for no scientific explanation of anything has ever been a complete explanation; but if they trust Nature so much, why do they deny it the power to act beyond the grave, since death itself is only a natural process through which every living creature is bound to pass sooner or later, and every natural process is merely the expression of a transformation or a change but never a destruction?

Some are willing to accept telepathy, for instance, as a practically demonstrated fact, which it abundantly is, but then they assume that only man in the flesh can possess that faculty and consider it antagonistic to spiritualism when it is one of the very best evidences we can have to support spiritualism. Telepathy is an interior faculty of the real man, not of his

body, which takes no part in it, except that of transmitting the impressions received in speech. Telepathy is the transmission of thought; thought is immaterial and takes no more time to leap over ten thousand miles than ten feet; yet "thoughts are things," as the popular saying has it.

It must be rather when the body is cast off that the telepathic faculty is developed to the fullest extent, as it would then be the normal means of communication, the material senses being absent. If departed spirits can communicate between themselves through this natural faculty, why not with men and men with them, though imperfectly? Man knows his exterior but very little of his interior faculties, which according to Swedenborg's inspired writings are opened after death. What Swedenborg calls "the interiors" is apparently what psychologists call the sub-conscious, subjective or subliminal mind or self.

We must logically assume that the realms of the great hereafter are governed by immutable laws, just as well as the realm in which we live in the flesh and the latter is as much one of the kingdoms of the Infinite Power as the others. The laws governing it could not exist of themselves unless they had been ordained by the same Infinite Power.

Although these things may seem so very strange to many, before denying them they would do well to find out whether they have fully realized the fact that their own personality, though closely allied with gross matter for the time being, is in itself absolutely immaterial. It would be so even if their personality were made out of matter turned into mind or spirit and consequently no longer material. But it does not necessarily follow that the mind may not remain associated with matter in an unknown state when out of the gross body.

What is still called the "occult" need not be called occult any longer, since most everybody may learn and practice it in these days. On the other hand, whether we call anything natural or supernatural makes no real difference, for in reality everything in nature is supernatural in its primordial cause and maintained by a supernatural Infinite Power, since we cannot logically account for it otherwise. If it is assumed that matter has ever existed by itself and acted by itself, then matter is the supernatural thing that no human brain can fathom, since it would embody the Infinite in the form of time with its ever-changing aspects and properties, its life creating powers, its faculty of evolving intelligence and understanding and main-

taining a working harmony throughout the Infinite by immutable laws, yet leaving the most intelligent of its creatures powerless to grasp the meaning of it all, while itself displaying infinite wisdom. That is substantially what materialism amounts to, whether the fact is admitted or not. No materialistic deduction can escape or fathom the crushing evidence of Eternity. Any philosophy or theory of the cause of causes in which Eternity is neglected as an absolute assertion and consequently left unexplained is a futile makeshift of no account whatever. On the face of it materialism practically means that no being, God or man, ever existed or will ever exist, who can apprehend the Infinite, since it is the assumption that man is the highest expression of being which constitutes materialism. To be in doubt as to the existence of a Supreme Being, that is, not to deny or affirm, is practically equivalent to believing that there is none, for it involves the assumption that Nature with its laws or the universe, embracing the Infinite, can be what it is without one and calls for none. This is high science as we have it, the science which considers Nature now and ever omnipotent of itself and by itself.

The notion of science is that at some period of

time in the unsoundable depths of the dim past matter was diffused throughout space in a native state so to speak, and then in some way, not to be accounted for, it commenced of its own accord to move, to roll, to glide, to condense, to collide, to whirl, and as the aeons of time rolled by, nuclei of worlds commenced to be formed. The process in the manufacturing of worlds went on, and here we are. This or anything equivalent is essentially the base of modern materialism. If science is satisfied with that monument I wish it good luck, for this problem at once brings us face to face with the gates of Eternity, beyond which no man can hope to peep. That is to say not on the earth plane at least. Why? That is precisely for inducing the materialist of all ages to acknowledge his folly.

While the doctrine of evolution is admitted here, both as to formation of worlds and development of living organisms, or life and intellect, that very doctrine leads us necessarily back to a commencement. But it is further assumed that all the worlds at present in existence were born from the debris of older worlds which no longer exist in the material plane; that these may have been born from still older worlds, and so on back through no end of time past. This

conception, however, leaves the problem of past Eternity and the infinity of Space unchanged and cannot satisfy the human mind as an explanation, whether we assume that there was a commencement to creation or not, unless at the same time we acknowledge the existence of a Supreme Infinite Wisdom utterly beyond the grasp of the finite and extremely limited intellect of man in its present material plane. This is where lies the doom of materialism.

We must bear in mind as already remarked that motion is the only kind of creation we can perceive in Nature, unless it be assumed that some matter is being constantly created out of nothing; that is the only alternative, which can hardly be entertained from a logical point of view. So that while matter is the basis of the universe it is its immaterial properties and effects that count, and these are evidently spiritual in essence, yet each is perfectly identifiable. It is this identification of the many different immaterial entities created by matter and perceived by immaterial or spiritual process that constitutes understanding and proves the fact of our existence as spirits. And since our actual existence resides in the spirit, though bound in a gross body for the time being, the latter is only a temporary instrument through which our personality

is built, but does not constitute our personality any more than the matter producing heat constitutes the heat itself.

Above all things, good, inspiring music is capable of awakening our perception of the sublimities of Nature, but only refined, sensitive minds can appreciate its thrilling harmonies and melodies to the fullest extent. Why does music please the ear? Is the sound of music material, and is the perception of it material? Evidently not, but it produces vibrations of matter which are transmitted to our mind and which our mind absorbs as knowledge and retains as a part of itself, for we may remember these vibrations many years after hearing them. The sound of music is only one of all the things we can remember. What is true of music is true of every perception of the mind whatever its nature may be, hence the reason why environment has so much influence upon our personality when prolonged.

The most striking proof we have that accomplished motion remains an entity in itself, and that man is immortal as a necessary consequence, is found in the fact that we have memory. Memory is immaterial; as already pointed out it is independent of the matter forming our body and consequently from our body as

a whole or part thereof. It is not matter, for matter in any state can be nothing but matter itself, unless it be assumed that it is transformable into immaterial spirit, in which event the whole universe would be still more spiritual in essence than it is assumed here. This latter assumption is the sole alternative imaginable to account for all the immaterial entities of Nature which I claim to be embodiments of motion, and matter would be only an appearance.

Memory is a recollection of past events, thoughts and actions of ours and of others, and acquired knowledge in general, all of which is immaterial, all of which represents embodiments of accomplished motion, all of which motions have ceased to be taking place. We have them all stored up within our personality. Their recollecting may and probably does call for further motion, but not necessarily motion of matter from the gross body; that would be motion of matter from the astral body, which, however, may in turn react on the gross body so long as the two have not parted company altogether.

Our conscious mind remembers only a small part occasionally of what came to our knowledge in the past, but the moment a person is put under the influence of the hypnotic sleep he can be made to relate

all the incidents and particulars of any event that came to his knowledge at any time in his life, though long forgotten by his conscious mind. The memory of what psychologists call the sub-conscious or subjective mind is perfect.

I believe we have only one mind, but as it is derived from the forces of Nature which have positive and negative poles, there must be a correspondence in polarity of the mind, and this would embrace two sets of poles corresponding to the forces of temperature and electro-magnetism.

The mind is derived from the forces of Nature, because it is made up of motion and motion is an effect of the forces. The existence of the mind may also depend on polarity like the forces themselves, for the mind is variable as it grows, and variability implies positive and negative poles.

VII.

I have endeavored to demonstrate from a really scientific point of view that although life is derived from matter, it is itself immaterial, consequently spiritual. We may remark here that life and spirit

are one and the same thing; life is the growing of spirit and this growing being effected by motion of matter, motion therefore is also identical in essence with life and spirit. All life being expressed and manifested by motion, all motion is spiritual, everlasting creation, because any event accomplished is an accomplished fact and will remain so for all time to come. It cannot be undone, and consequently cannot be destroyed. Any motion of any kind is an event or fact taking place and it is of facts and events accomplished and in the act of accomplishment that the real world is made of. Life, which is a succession of accomplished facts, being once born is therefore eternal, but ever changing in aspect by the additions made to it. From this follows spiritual evolution—the only kind of evolution there is or can be, since matter can only make its many cycles over and over again, but never changing its essence.

If accomplished events, which means accomplished motion, were not entities in themselves there would be no conceivable entity in the universe, either temporary or everlasting, besides the Infinite and matter, as nothing else would exist, unless every event was destroyed in proportion as it took place, so that we could get no memory whatever of any instant preceding an-

other, consequently no intelligence, no will, no spirit. All living organisms would be temporary material automatons merely. Even were life at all possible under such conditions it would be closely equivalent to no life at all. I do not even consider that this is the kind of life giving us the vegetable kingdom, for vegetable life represents the accomplishment of events and we cannot conceive of these being destroyed in proportion as they take place or otherwise.

We may therefore repeat again that everything in Nature other than matter itself is a creation born from matter. This includes all the forces, life, intellect, and mind or spirit. This fact should be apparent to all, and also the fact that all creation is accomplished motion because it can be nothing else. Our real persoanlity can be nothing else now any more than after death.

Whenever we do any action, it is by motion that this action is accomplished. Our first idea of doing this action takes place by motion. The body is the instrument through which we do it, both in thought and accomplishment, and when accomplished it remains an entity which we remember. Therefore it is through the instrumentality of the matter of our body that this entity is created. Matter is thus made to

obey the will of our immaterial self, which is the directing agent, and this action or entity is added to our personality or real ego. It is thus through the forces of matter that spiritual entities are created, for all motion calls for energy.

A part of the energy expended by a locomotive drawing a train on which we ride becomes a part of our personality, because it permits us to travel great distances and accomplish many things we could not otherwise do. Similarly a part at least of all energy from any source directed by us to do anthing for any purpose becomes a part of our personality. Hence all progress in mechanics and the industrial arts constitute a very important element in the evolution of man's mind.

VIII.

Nature or matter generates life in all manner of forms, in all kinds of places, always taking good care to provide means for the perpetuation of all species, both animal and vegetable. This it often does by extraordinary means when the conditions for preservation and perpetuation are especially forbidding. From

the minutest particle of matter to its totality reactions are provided to counteract any action tending to destroy the equilibrium whenever a law of stability is involved. Considering all the marvels of Nature matter must be infinitely sagacious indeed to have planned everything so well, and it should be extremely interesting to know how this sagacity is to be accounted for if it is its own only. Clearly then, matter would be God Himself or a part of Him, and man would be more of a spirit than God. But this view excepting the last part, may not be so very wide of the mark. At any rate my interpretation of matter is that it is a form of God's manifestation adapted to provide a medium for the birth of life and for elementary perceptions in the lower stages of its existence.

We might say that matter is alive, but it is a great deal more than alive; it is unlimited life giving without ever parting with any of its own life. It gives us everythng, including our own selves which we build from it, or rather, everything it gives us is embraced within our own selves and is what goes to make it at our own choice.

Here comes the great question which no doubt the observant reader has often thought of before: If this doctrine be true, what becomes of all the representa-

tives of the animal and vegetable kingdoms after death? No man probably can answer this question satisfactorily at present time, and I would not attempt it unless in some vague hypothesis and perfunctory sort of way. But nevertheless I hold that every living thing is an imperishable entity. That this entity may possibly be dissipated or transformed after death but not destroyed. I hold in fact that there is no death in the sense of annihilation of anything once alive, death being merely one step of evolution; that is, life in any form remains life forever in one form or another.

If it were not so, there is no apparent reason why man's spiritual existence could not or should not have an end as well as that of any animal, for life is born of or propagated by matter in man as well as in animals and plants, and is immaterial in either. Furthermore, it is on the assumption that everything alive on earth remains alive after the so-called death that natural conditions may exist on the other side of it as on this side.

The only fragment of direct evidence I have at hand tending to give color to the above is the following article extracted from the San Francisco Examiner of Dec. 5, 1904:

A CASE OF ANIMAL TELEPATHY.

H. Rider Haggard, author of "She" and other novels that treat of the border line between the known and the unknown, writes to the London "Times" a serious account of his receiving a telepathic message from his dog, either at the moment of the animal's death or several hours after.

The novelist writes:

"On the night of Saturday, July 9th, I dreamed that a black retriever dog, a most amiable and intelligent beast named Bob, which was the property of my oldest daughter, was lying on its side among brushwood or a rough growth of some sort by the water. My own personality in some mysterious way seemed to me to be arising from the body of the dog, which I knew quite surely to be Bob and no other, so much so that my head was against its head, which was lifted up at an unnatural angle. In my vision the dog was trying to speak to me in word, and, failing, transmitted to my mind in an undefined fashion the knowledge that it was dying.

"Then everything vanished and I awoke to hear my wife asking me why on earth I was making those horrible, weird noises. I told her about the fearful struggle

and that I dreamed old Bob was in a dreadful way and was trying to talk to me and tell me about it. On Thursday, the 14th, the body of the dog was found floating in Waveney, more than a mile away, and on Friday two plate layers informed Mr. Haggard that the dog had been killed by a train. Bob's collar, broken and torn off, was produced, and on Monday afternoon one of the men saw the dog floating in the water beneath an open-work bridge over the river, whence it drifted down where it was found. Carefully weighing the evidence, Mr. Haggard concludes that the dog must have been killed by an empty train from Harlesdon a little after 11 o'clock on Saturday night, as no trains run on Sunday, and that it is practically certain it could not have been killed on Monday morning. Mr. Haggard therefore confesses himself forced to the following conclusions:

"The dog Bob, between whom and myself there existed a mutual attachment, either at the moment of his death, if his existence can conceivably have been prolonged until after 1 in the morning, or, as seems more probable, about three hours after that event, did succeed in calling my attention to its actual or recent plight by placing whatever portion of my being is capable of receiving such impulses when unchained by

sleep into its own terrible position; subsequently, as the chain of sleep was being broken by the voice of my wife calling me back to the normal conditions of our human existence, making some last despairing effort while that indefinable part of me was being withdrawn from it. I recognized further that if its dissolution took place at the moment when I dreamed, this communication must have been a form of that telepathy which is now very generally acknowledged to occur between human beings from time to time, and under special circumstances, but which I never heard of as occurring between a human being and one of the lower animals.

"If, on the other hand, that dissolution happened, as I believe, more than three hours previously, what am I to say? Then it would seem that it must have been some non-bodily but surviving part of life or of the spirit of the dog which as soon as my deep sleep gave it an opportunity reproduced these things in my mind as they had already occurred, I presume to advise me of the manner of its end or to bid me farewell."

Appended to the letters are certificates by a veterinary surgeon who inspected the body of the dog, which he says must have been in the water three days, and by Mr. Rider Haggard, Angela Rider Haggard,

Lilias R. Haggard, L. R. Hildyard and Ida Hector as witnesses to the nightmare story having been told at breakfast on Sunday morning. Mr. Haggard says he will welcome any investigation by competent persons.

IX.

These considerations seem to amount to a call for the doctrine of successive reincarnations or rebirths in all living organisms, whereby a chance would be given to each individual entity to improve itself at each new birth, for this would be the logical conclusion to be reached in explanation of the progressive evolution of species on earth. Can we get scientific evidence that reincarnation is a fact? May be it is not very far off, but if rebirth is a fact with man it is a fact with every living organism. That is the only view satisfactory to man's understanding, judging from what is already known.

From these observations we may conclude further that the size of the body, either in man or animals, has nothing to do with the degree of intelligence. A flea may be as intelligent as an elephant and probably is. Consequently the whole intelligence and spiritual ex-

istence of an elephant may be reincarnated in the body of a flea or vice versa, but different animal bodies provide different faculties. Humanity may have passed through successive reincarnations in all kinds of animal bodies. This, of course, is only a suggestion, not an affirmation.

We may suggest again, merely as a question for study, that our tastes in food, colors, etc., and all natural propensities may have some relation to former animal forms of life. For instance, we may like best the meat of animals representing our most recent connection with brute creation, or else the kind of food preferred in that state of existence.

Another great question is: What becomes of all events not under the control of any individual living organism or of all living organisms combined, i. e., the sum total of all the motions made by and occurring upon or within celestial bodies and not directly connected with the creation of living organisms or life? My hypothesis is that they go to make the life and spiritual counterpart of the celestial body in which such motions or events take place; so that the earth for instance would possess such a spiritual counterpart embracing all its past history, and which will remain in existence forever, whether the earth continued

to exist as a planet or is annihilated as a celestial body through some cataclysm or natural death.

The earth may also possess an astral or etheral but still material counterpart, for accomplished motion alone as an entity is wholly immaterial.

I consider besides that such invisible spheres of the earth must be the abode where departed spirits dwell, at least for a time and until they have reached perfection. This would give us a clue for verification of the wonderful tales of seers claiming to have penetrated into spiritual realms and seen things not expressible or describable in speech while still living in the flesh, among whom Emmanuel Swedenborg stands most prominently. Even at the present time there are seers living claiming to have had experiences of this kind.

The principal evidence I have to offer in support of this theory—that of spiritual spheres of celestial bodies—is that if my theory of life be true the former must necessarily be true also, but that is a most potent argument. It is corroborated by other evidence, however, as we will see.

It is often stated by the more advanced students and exponent of modern psychology that there are finer or more subtle forces than those we know of. With this view I agree and assume it to be true, but at the same

time submit that these subtle forces are derived from the grosser forces which we do know. The mind of man, or rather man, is a seat and nucleus of such forces and an instrument capable of putting them into what I will call vibration for lack of a better term, for what is put into alleged vibration is immaterial. This is what gives us telepathy and all the still very little understood and unknown powers of the mind. Telepathic communications must be effected through the medium of the spiritual spheres of the earth.

This reminds us of the wonderful discoveries of Reichenback and of Col. de Rochas on hypnotism, described in Chapter I, where spiritual or astral spheres are seen in the dark by hypnotized or sensitive subjects to surround living persons, animals, plants and the poles of magnets. The earth, which is a great spherical magnet, must possess such spheres extending all around it. This is another piece of inductive evidence whose import will be readily understood, since it is almost as certain to be a fact as if it could be actually perceived. From this it must be inferred also that the spiritual spheres of the earth are linked with it and that the case is the same with all the worlds of the Infinite.

Considering that a simple permanent magnet pos-

sesses spheres of "luminous effiuvia" which the best sensitives could see to extend a distance of over two feet around the poles, it follows that if the earth were as strongly magnetic as a bar magnet proportionally to its size, the earth spheres would extend for many million miles all around it. This, however, is assuming that it is the magnetism which is seen in the spheres, and that cannot be the case, for plants or small animals would not be sufficiently magnetic or develop luminous effluvia at all perceptible to non-hypnotized sensitives, as in Reichenback's experiments. Yet it is quite likely that any body strongly magnetic is the seat of effluvia, because it is a seat of motion, so is a plant, so is an animal or man.

My surmise is that the so-called luminous effluvia is nothing more nor less than the spiritual and astral spheres of the body bearing it, or the astral sphere alone in any event.

The truth or falsity of this hypothesis may probably be verified experimentally.

If the effluvia includes the spiritual sphere or spheres, it follows that we can actually see spirit—absolutely immaterial entities—while living in the flesh, although it would probably be necessary to be in a hypnotic trance or some other abnormal state.

Since the spiritual spheres are made of accomplished motion, the more there is of it the larger should the sphere be. Then the sphere of a newly made magnet, of a young plant, a young animal or a child should be smaller than that of older representatives of each specie.

In order to find out about this matter, I would make the experiment with an old and a newly made magnet of the same strength and size, because in case the effluvia of these two magnets should present considerable difference in size, this would be a very plain proof that the spiritual sphere forms part of the effluvia if not the whole of it, for in the case of magnets, if the effluvia consisted of the astral sphere only there could be no such difference in the size of the effluvia. The magnets being of the same strength the effluvia should be alike in both whichever else than accomplished motion it may consist of.

We may reasonably hold that everything we perceive in the material world has one or more spiritual counterpart in an ascending scale, universal evolution being understood to work unto Eternity.

This chapter will end with the following interesting article taken from the San Francisco "Examiner" of Oct. 22, 1903:

THE PERSONALITY AND THE BODY.

By H. J. W. Dam.

It apears to be a characteristic of human beings that the personality and the body are separable. That the personality or individuality or Ego can leave the body during life, go away to an indefinite distance and return to the body. That death is merely a permanent separation, the personality containing its existence under the same general conditions as characterized its absences during life, while the body is resolved into its elements.

There are four general classes of cases which have been carefully examined and responsibly vouched for which have led observers to this belief. These four classes may be characterized as follows:

1. Clairvoyance.
2. Possession.
3. Apparitions of the living.
4. Apparitions of the dead and the phenomena of Spiritualism.

To illustrate the faculty called Clairvoyance, here is a case from the records. It is an old case, chosen because of certain characteristics:

Miss B. is a fragile, delicate girl of twenty, whose

health has been shattered by an accident four years ago, in which she received a severe blow on the head. The clairvoyant power is most commonly found in women whose vital hold has been weakened in some such way. This is not invariably the case, however. The writer has known clairvoyants, both male and female—always non-professionals, who had nothing to gain by the exercise of their gift—who in all other respects were perfectly normal and exceptionally vigorous in their physical constitution.

Miss B., sitting in a room in Providence, R. I., with a number of ladies and gentlemen, is asked if she will go to Roxbury, Mass., where, as is well known, she has never been. This request is made by an investigating Protestant minister of the highest standing, who lives there.

Miss B. consents and relapses into unconsciousness. Her personality or individuality, or Ego, goes away. It cannot be said that her mind goes away—and this is a most interesting point—because, wherever her personality may go, she still sits in front of you, unconscious, and tells you what she is seeing and what she is doing. Her touch with her body is constant.

She goes to Roxbury, following the railway. She goes, as she says, through the air. Motion is unde-

niable and time is an essential factor. This time of transit, which appears, so far as the records go, to vary directly with the distance, is the first point upon which an exhaustive investigation would probably seize. There is plenty of data concerning it already.

She reaches Roxbury, which fact appears from her questions and her description of familiar landmarks. She asks if she may go into a shop which attracts her. She is told that she may. She wants an apple. She is told that she may have it. She takes it from a stand, eats it and says that it is very nice. Then she is confused and blushes. Asked why, she says she has no money to pay for it. She is given some money, lays it on the counter and goes out.

These details are given because anybody who is analytical can see their importance. Miss B.'s entire personality in all respects, including her self-consciousness and her sense of humor, is clearly in Roxbury.

She goes out of the shop and asks her way. The minister directs her along the streets, she turning corner after corner, as is clear from her description of them. Finally she reaches the minister's house.

She enters the house, and, as directed, goes into every room from garret to cellar. She accurately described all the furniture, decorations and persons there

present. To remove the possibility of telepathic influence, the furniture, paintings and decorations have been disarranged in a way which no one present, including the minister, knows. Her description, verified the next day, is found to be perfectly accurate.

Passing from one room to another she says she is very tired and asks if she may rest on the sofa by the door. She is told that she may and does so. This fatigue, most frequently complained of by disembodied personalities and ascribed by them to the strain of communication under adverse circumstances, is also full of interest and points to some very interesting physical facts.

She goes all over the house as requested, describes, comments, admires and questions precisely as if she were a material guest and the minister were showing her over his home. When the house has been minutely inspected and the minister announces himself as satisfied she returns to herself and becomes conscious. She knows nothing of where she has been and of what she has seen and said.

This is an ordinary case of clairvoyance. A hundred cases with a hundred different clairvoyants who have no training, no knowledge of each other, no possible

community of action, will all reveal the same general facts.

The best clew to the physical facts which underlie this phenomenon lies in a remark of "Pelham's" during the "Piper Experiments." These experiments were conducted by Dr. Hodgson, representing the Psychical Society, through the mediumship of Mrs. Piper, of Boston, and covered a period of ten years, from 1887 to 1897. The chief communicating spirit was "Mr. Pelham," a young lawyer of the University Club, New York, who had promised Dr. Hodgson that if Dr. Pelham died first he would do all in his power to reveal to Hodgson the truth concerning post-mortem conditions.

Mrs. Piper's personality, as in clairvoyance, had gone away, Pelham was using her body for purposes of communication precisely, though with much greater difficulty, as Miss B. used her own body. This fact was constantly manifest and was the basis of much inquiry and discussion between Hodgson and Pelham.

Pelham was on one occasion asked to go to New York and come back and tell them what his father was doing. He went, precisely as Miss B. went, came back and said his father was walking along the street, going to a photographer's and carrying a cracked pic-

ture of him (Pelham). This was absolutely verified as to time and facts and the astonishment of the father and mother, who had no knowledge of or belief in the phenomena under investigation, which unmistakably appears in their letters.

Pelham was asked to describe the conditions under which he still existed. He answered: "I exist as an Ego, combined with Thought. I cannot make this any clearer to you."

Well, that is the way we exist right now, but our personality animates a body of clay which the materialists consider our personality. This habitation shuts off the perception and some faculties of the more purely spiritual state.

X.

Notwithstanding his smallness it is glorious indeed for man to know that there is no end of time for him, for the Power who made him want the eternal bliss of all, and His laws are such as to bring them there in the long run, but man is given the privilege of following the longest or the shortest road, the length of which is determined by his right and wrong doings,

and not by any special creed, tenets, ceremonial practice or ministration of any other man.

Any man who pretends to own a set of keys for opening the byways of a paradise to other men is obviously a fool or an imposter, but more foolish are those who accept it as truth. Here is an example, behold: A man who has expended his worthless life in a career of crimes of all kinds, at the last moment allows himself to be persuaded to confidentially confess his misdeeds to a priest who gives him the absolution by a few Latin words and signs of the hand. That man's soul is saved and he will share for eternity the blessings of the "elect." Another man of good moral character who never seriously wronged anybody but who positively derides the claims of the "Church," at the last moment cannot change his mind and dies without. Woe to him: that man's soul is forever lost. If that is not simply a supremely impudent audacious outrage to human intellect and understanding, then we are all idiots.

Man has to find out all truth by himself. In this way only is he fully free. If the truth were told him by supernatural revelation he would not believe it and would consider it an imposition, claiming the right to accept or reject it.

The many religious doctrines contain probably some kernel of veiled truth, but it has to be disentangled from a great mass of error, and the whole truth we cannot well expect to reach on the material plane, for further progress would then stop.

The purpose of the Creator cannot be to condemn a single one of His creatures to eternal torment and misery. Think of Eternity with not a ray of hope! The sole idea brings a shudder of horror penetrating to the marrow of the bones and is a most abominable blasphemy. How much more so if it should extend to a majority of human beings! If the teachings of any of the older religions concerning the saving and the loss of the "soul" of men were true, God would be an inexpressible, pitiless, hateful, fiendish monster of cruelty and injustice beside which the most ferocious criminal that ever lived would be a harmless lamb in comparison. Like the tyrant who thirsts for blood, God would thirst for the suffering of ever increasing millions. An endless army of human beings would be constantly marching by the million to eternal torture, solely because they either happened to be born with bad natures, or lived with bad environment, or could not believe what was told them by some class of self-styled teachers of the laws of God, with nothing to

prove their claims but books printed by men, originally written in ages of deep ignorance, with no sign of Divine authorship, and full of statements disproved by scientific evidence; or again because they never had the opportunity to hear these teachers or learn the contents of their books; because they failed to be born under the auspices of some certain creed—the only true one—(every one of them is the only true one, otherwise of what use would it be?) or failed to learn its tenets and distinguish it as the real thing; (it would be necessary to study them all first, spend a lifetime at it and have nothing else to do), all of which conditions are generally beyond the control of every individual.

Those, however, who are lucky enough to buy a ticket for the other way, even if only at the last minute, those are the few ones who catch a big prize at the lottery of life or God's lottery.

No man or all men combined can possibly do any good or harm whatsoever to God. Why then should He be so vindictive without cause against his own helpless, unfortunate creatures who did not ask to be born, either good or wicked; why? Pray give us the answer, oh ye sages of the world. If they were at least annihilated for evermore since they were brought

into the world without their consent being asked, they would be in luck, but no, nothing of the kind; they have to suffer. God made them so as to enjoy their dismal plight eternally.

In men's tribunals mercy is shown by putting dangerous criminals out of the way by the most expeditious means and with the least suffering, but at God's tribunal there is to be no mercy, and all but a small minority will be found criminals. So that after living a few years of more or less wretched existence, most of us, dear brothers, must get prepared to be used as feed for God's furnace, under the management of his horned Majesty you know. Term of punishment by agonizing tortures of Hell-fire and indescribable anguishes with no possible pardon: Eternity!

Our burning at the stake, and other torturing inventions are child play and futile attempts to imitate God's devices, all being over in a few moments and the occurrence rare. They are not even the shadow of a foretaste of what await the victims on the other side. But we hear people talk of cruelty, savagery and ferocity among men! Pshaw, all men are doves.

Yet the teachers of all denominations tell us that their God is infinitely just and good and that we must not trust our reason, but only what they say. More

than that: it is extremely sinful to listen to or to read any "impious" work which might make us think. And so is the world going. That does not speak very well for the intellect of the human race, but it is improving.

Take away the bugaboo of terrible punishments in an unknown realm and all the ancient religions fall to the ground so far as unbiased minds are concerned. As to the biased ones, their beliefs once planted in their mind, no matter how absurd, when held long enough become a sort of cultivated insanity almost ineradicable because they grow with them and make a part of their own selves.

All religions have had their usefulness on the ground that, in the absence of a knowledge of the truth, a superstructure of morals had to be provisionally built on hypothetical premises. It is the same in this regard as with scientific matters. But now the time is coming when science and religion will be reunited and found mutually complementary of a whole philosophy.

Both science and religion will have to make great concessions, especially the latter, which has made no sensible progress for thousands of years, because all creeds are based on alleged revelation and therefore dogmatic. But since we had no revelation concerning

the laws and secrets of Nature there is not much reason for assuming that we should have had revelations on ethics, and all religions are only codes of ethics with allegation of supernatural or Divine authority and various assortments of fancied duties toward the Author of all.

One of the best ways, not to say the very best, for proving genuineness of supernatural revelation concerning man's duties, would have been to associate it with revelations of a scientific nature, but these we are still waiting for as a direct positive statement.

Still we are having revelations, or rather manifestations enough from the spirit world to satisfy the unsophisticated investigator of one thing, which is that death does not end all. This is another instance in which the authority of the schools is to give way to the authority of accumulated and multiplying evidences of many kinds.

Although we meet with many conflicting accounts and theories in the tenets of spiritualism, the latter offers the only gate through which scientific investigation of man's destiny may be approached successfully. This cannot be carried on by the laboratory method, but that is no reason for science or anybody to disparage investigators in this line.

The trouble with the Bible, any bible, is that it is builded upon a stumbling block for a foundation—the story of creation—which in the light of present knowledge is manifestly inadmissible, both in regard to time and the true relation of man to the animal kingdom. The story of creation as narrated in the Bible plainly shows gross ignorance of many great verities discovered in modern times, especially in astronomy, geology and biology.

Was matter ever created out of nothing? How and when did the world, or the first world, commence? or did it ever have a commencement, with a commencement of life at some point of the Infinite? How many worlds have existed successively and simultaneously? How many are existing now? What becomes of animals after death? If they are turned to nothing at death, man must be turned to nothing also, or the rightful measure of justice to animals would be denied them. Furthermore man himself is descended from the animal kingdom, therefore if there is no life or existence for animals after death, at what stage of man's evolution did he attain a claim to his existence forever? These are only a few of the points upon which the Bible gives us mighty little reliable information. Neither do we find it outside the Bible. The

chasm of ignorance of mankind is still so intense that we may consider ourselves as barely emerging from the depth of chaos, and it looks as if man had to solve by himself those deep mysteries confronting him, with possible assistance from the world beyond when we are prepared to meet it. If this is the case man must possess within himself the germ of knowledge which only awaits cultivation and development or evolution, but the initial story of the Bible only tends to smother both. From deep down the sub-consciousness of man will come the revelations. I wish to advance the proposition that the germ of all knowledge to be attained as well as that already attained lies within the sub-conscious or negative pole of man's mind and that what part of truth may be contained in the sacred scriptures of all creeds is derived from that source through men in whom the subliminal sight was highly developed either naturally or by special design of the Deity, yet not exempt from wandering astray. This would account for the errors and the multiplicity of doctrines and tenets extant in religious matters, at the same time, implying the evolution of a divine spark in man, more or less perverted by him; so that the bibles of the world would be at once products and tools of evolution, and should follow it.

The laws of God are simply the laws of Nature, and we may trust these to cause all wrongs to be righted in the end, for they necessarily extend beyond the material plane, since man himself is a product of these laws and as such embraces laws within himself of which he knows still very little.

In correlation with the foregoing we may proclaim that the Trinity of the Infinite is God himself for a triple reason: Because God is Infinite; because the above is the only infinite spiritual entity conceivable to man as certain to be a fact; because God would not expect all men to believe in an entity inconceivable to them and supported in the abstract only by hearsay of other men, self-styled instructors, who know no better than I do, while the Infinite is the universal sign manifest to all as a concept of the Supreme.

If the Infinite were not God, it would be a companion entity transcendent human reason quite as much as God himself, and there is no call or implication for such an assumption, even in any of the higher creeds extant. In consequence of which the belief of mankind that the Infinite is God would be perfectly excusable and justifiable before God Himself, even though it were not so. But in the absence of a direct unmistakable revelation to every human being, it is

inadmissible that such a necessary mistake should have been imposed upon mankind by the Divine Wisdom.

Anything as great as God in any particular must necessarily be identified with God Himself. This is simply a plain dictate to man's reasoning faculties. We might say further that this is the explanation of our lack of instructions upon things which man can find out by himself and which in most cases he would not or could not believe if revealed to him.

We will conclude by saying again that nothing is lost in Nature and that man's thoughts and actions are entities which will follow him as his heritage and part or the whole of himself.

Accordingly spiritual man like everything else in Nature except matter, is the product of the transformations of the forces in that matter whereby its motion and consequent creative power is perpetual. This is no uncertain theory; it is a fact that should be manifest to all who take the trouble to reflect.

I dare assert positively that herein lies the solution of the basic principles of the mystery of life and the irrefragable proof of our spiritual nature and immortality. Before science can be true it shall have to introduce the spiritual into its vocabulary.

XI.

A recapitulation of the principal great principles enunciated herein and considered as proven or very near may then be summarized as follows:

1. Forces have positive and negative poles. Heat and cold are the opposite poles of one single force; so are electricity and magnetism.

2. Both forces are derived from the chemism of matter. So is everything else than matter itself and embraces all life and motion in the universe.

3. The motion of the universe is permanently maintained by the combined play of the positive and negative poles of the natural forces through mutual polar transformations and the energy derived therefrom, which is thus inexhaustible.

4. Excepting the Infinite and matter, everything else in Nature is represented by motion of matter and is consequently immaterial or spiritual in essence.

5. Accomplished motion remains an imperishable entity in itself and is the basis of the spirit of man or the man himself, who is therefore immortal.

The preceding doctrines will no doubt create controversies, but I hope the seeds are vigorous enough to grow in spite of anticipated opposition or even in-

difference. I advise the real champions of progress to investigate along these and other lines and they can hardly fail to get some reward if persistent. It is not necessarily essential to have ever passed through the portals of any university or college to look for and find out the truth. In fact that may be a hindrance. Nature's great Book of Hope is open to all and all may learn to read its pages, for we, all, have before us Eternity.