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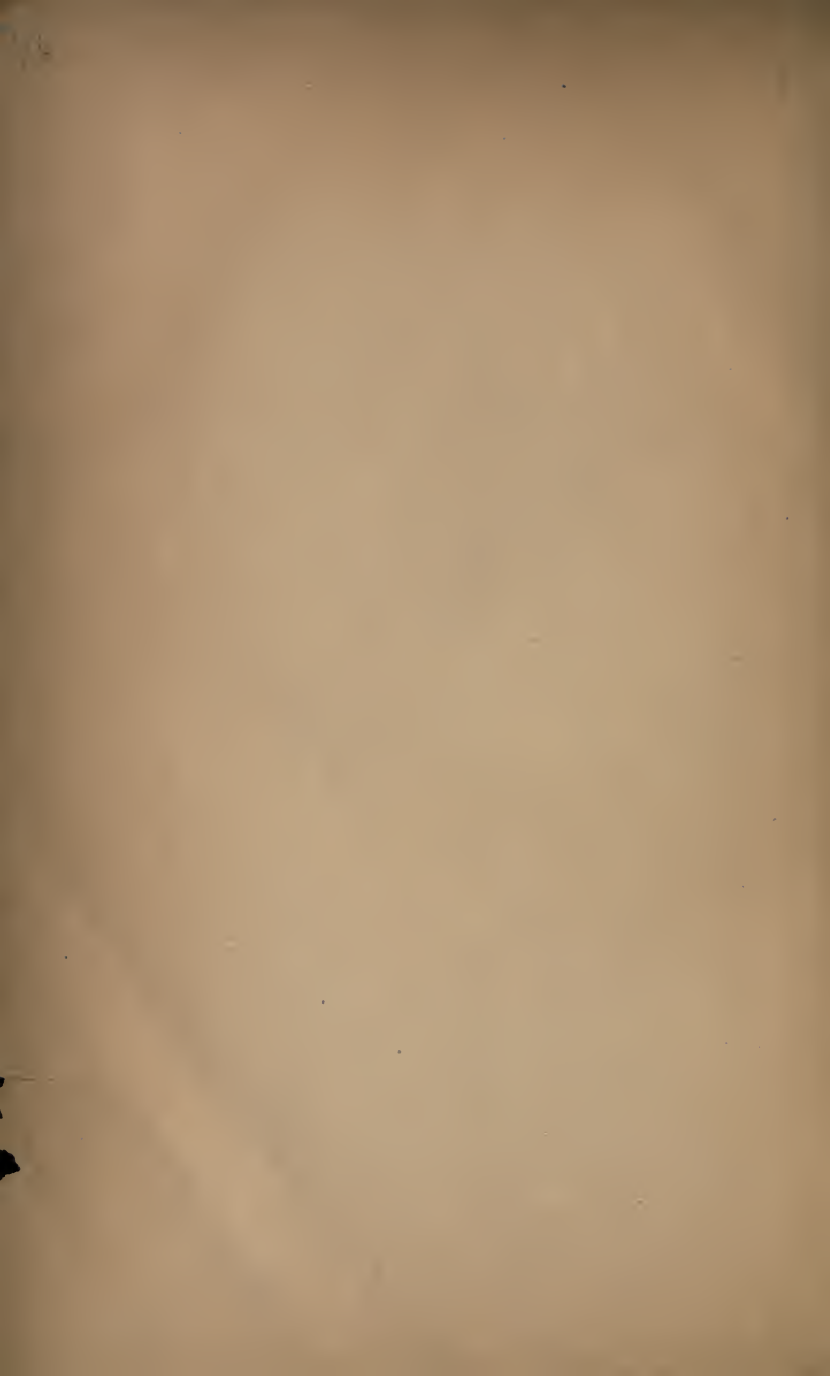
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RHYTHMIC HEREDITY

MATTER A PROPERTY OF ENERGY



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# RHYTHMIC HEREDITY

MATTER A PROPERTY OF ENERGY

BY

H. CROFT HILLER

AUTHOR OF "AGAINST DOGMA AND FREE-WILL AND FOR WEISMANNISM" AND  
"THE SUPERNATURAL OF SCIENCE AND RATIONALE OF SOCIALISM"



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## PREFACE

IN writing this work, I have the following main objects: to show that, before matter existed, a supermechanical factor energized; that matter is the product of this factor; that all response of matter is based on rhythmic synchronism with ethereal vibration; that ether is composed of particles which are material representatives of supermechanical potentialities. In endeavouring to accomplish my purpose, I have adopted the same method: that of straightforward inference from facts apparent to the common sense-perceptivities, used in "Against Dogma and Free-will and For Weismannism" (in which work I have tried to help the downfall of current theology and the "free-will" assumption on which it is based) and in the pamphlet entitled "The Supernatural of Science and Rationale of Socialism" (in which I have sketched a specific theistic creed and tried to prove the theoretical accuracy and, under

necessary conditions, the practical advantage to society, of Socialism).

Believing that modern instruments of thought, like those of surgery, to be effective, must be adapted to the objects they have to penetrate, I have, as far as possible, studiously avoided any approximation to the method of metaphysic. I assume that, at this day, society is too tough a subject to be susceptible to metaphysical "blades." Accordingly, to the best of my ability, I have adopted a strictly scientific procedure, though, in view of the necessarily highly speculative elements involved in my inquiry, I have, to some extent, been compelled to project my ratiocination beyond what are conventionally considered the strict limits of scientific induction. On the other hand, as scientists, so far as I am aware, have not hitherto investigated on the synthetic lines adopted in this volume, I trust that any scientific reader may overlook special divergences from his own method, if these issue in a rational confirmation of the propounded hypotheses.

*September 20th, 1894.*

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# RHYTHMIC HEREDITY.

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## MATTER A PROPERTY OF ENERGY.

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### CHAPTER I.

### ENERGY.

ALL physical science is based on the assumptions of energy, ether and matter. Let us consider a typical example of energy. This we call motion. We again recognize various sub-divisions of motion. Such modes are radiant heat and sound. Some scientists will not grant the assumption of motion without including with it the assumption of something that moves. Now, it is one thing to recognize our inability to perceive motion except when combined with matter; it is another thing to assert that motion does not exist independently of matter, as a fundamental reality. To perceive motion, our faculties require that it shall exist under special conditions. But, before these conditions could arise: before ponderable matter could react, there must be an exciting

cause which is something altogether distinct from the matter. Varying the statement: all atoms manifest energy; inert matter, so far as we know, does not exist in the universe, because no matter exists which energy does not permeate. The reason why no such matter exists is that matter issued from energy. We will endeavour to establish this proposition. The statement that motion is a property of matter really implies merely that we know of no matter which is not allied with motion. But, we know of motion which is not allied with matter. We recognize this motion apart from matter through the motion's effect on our organic particles: through energy's effect on nervous molecules, issuing in what we call the logical faculty. This faculty also enables us to apprehend another fact beyond the reach of our sense-organs: the fact of the existence of what physicists call a perfect medium, or ether. The ponderable inevitably drives us to acknowledge the imponderable. Lord Kelvin has formulated what is really an abstraction to account for the evolution of matter. Known better as Sir William Thomson he is acknowledged as

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one of the greatest physicists of any age, and we all recognize physics as a very practical science. Still, this great physicist tells us that matter is evolved from portions of a fluid which fills "space"—distinct portions of this fluid containing legions of infinitesimal particles which have somehow become endowed with fixed rhythms of motion (called vortex, of which we may see an analogy in the rings which a smoker can produce). Each of these primordial systems constitutes, according to the hypothesis, a particle of elementary matter, or what we call an atom. Now, to propound an hypothesis which merely assumes a more minute ponderable as the first cause of all other ponderables, is no more effective procedure than starting speculation with any of the other ponderables. If our "fluid" is nothing but an agglomeration of lesser "atoms," as we will show, it must be, on the conventional hypothesis, we are merely, in thus speculating beyond ordinary atoms, turning a logical treadmill: we do not progress. This point will be dealt with in our consideration of a perfect medium.

In the meantime, let us apply a few known

facts to establishing energy on an independent basis. Biology tells us that organisms have been evolved from primordial agglomerations of a specialized substance which we call protoplasm or elementary living matter. The agglomerations we call germ-cells (see "Against Dogma and Free-will and For Weismannism" for a concise statement of the latest theory of organic evolution). We can satisfy our reason that each of these germ-cells is composed of still smaller particles of living matter and that the co-operation of these smaller particles energizing according to their specialized functions, effects the evolution of an organism. We are driven to assume that no part of an organism exists as such in the germ-cell. In fact, had not observation convinced us that the organs and members of the adult structure were directly derived from this minute speck of germ-plasm, not the wildest flight of imagination could have conceived such effects as occur in the course of the simplest organic evolution. Only from pondering the revelations of physical science can we realize the pure relativity of all our sensual impressions. The physicist deals with millions—



as the grocer, with dozens. Lengths of luminous waves are expressed in millionths of a millimetre, the extent of molecules in fractions of such millionths—why should such deductions excite our incredulity more than the statement that an apple weighs a few ounces? Merely because we are prone to mistake the relative for the absolute.

We stated that the germ-cell does not contain minute representations of all parts of the organism. What then does the germ-cell contain? It contains potentialities. We never saw, felt, heard, or tasted a potentiality. What is it? Conventionally considered, a potentiality represents what we call an abstraction. Abstractions are sometimes as influential over organism as are the sense perceptions from which they originate. Other abstractions appear reasonable to a few brains, but are futile as influence on the generality. Others, again, may be utterly delusive and yet exercise considerable influence. We may consider as axiomatic, that abstraction, to be practically serviceable to mankind, must not be projected far beyond the scope of sensual perceptivity; in other words, its connection with ascertained facts must be appre-



hensible by average intelligence. For brain-action which issues in this sort of abstraction I have coined the term intellectual sensualism, and in this work will try to use abstractions so that they may be acceptable to intellectual sensualism. We cannot to physical demonstration sever inorganic matter from energy, but we can sever the form of energy we call life from organic matter. Then we are driven to acknowledge that this "life" is something distinct from the sensually perceived medium in which it manifests itself. At present we divide energy into various categories, but the tendency of science is to recognize that this is arbitrary procedure; that our present distinctions are conventionalisms which increasing experience will compel us ultimately to discard. As we find that all our "forms" of energy affecting inorganic matter are interchangeable; as we can empirically effect a cycle of all the known forms by transforming one into the other through altering the conditions of manifestation, what logical reason have we for assuming that the energy we call life is distinct from the others: that it is not a special manifestation of the same original? The only

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reason for this assumption is that we cannot, at present, transform any of the other forms into "life." But this is merely measuring the capacity of "nature" by the capacity of one of nature's products. Could we form active protoplasm from what we call inorganic elements, we should be compelled, at once, to renounce the conclusion that "life" is essentially different from any other manifestation of energy. And it is not exceeding the bounds of reason to affirm that the transformation of the "inorganic" into the "organic" may ultimately be within the scope of human empiricism. Of course, this achievement would not mean that we could fashion energy; it would merely mean that we had discovered more of its function. Moreover, could we even transcend this achievement by empirically producing the *elements* of which protoplasm is composed, we should still be practically as far as ever from the production of energy. We should simply have attained a fresh experience of its application to matter.

In these days, no rational and instructed man denies the facts of evolution: that all phenomena

affecting matter are the issue of progressive specialization of function inherent to matter. The reader will observe that, in this work, we are trying to discriminate with regard to the function of matter: that we do not deny the inherency, but assert that the function is not *initiative*, but *responsive*. Finding that this evolutionary process dominates the cosmos, and assuming that the cosmos has limits beyond which evolution likewise prevails, we must grant that before evolution energized with regard to the cosmos it affected something beyond matter as we recognize it to affect matter. We must grant this, if we grant a finite cosmos. I will later deal with the assumption of an infinite cosmos. The matter we can "kill" is that matter from which we can eliminate a certain manifestation of energy, called life. But this does not mean that we have eliminated all energy from the matter—or, rather, that we have prevented the matter from responding to all other forms of energy. If we add Hydrogen to Chlorine, we at once obtain matter with altered responsive function, and we "kill" the two gases. But we can "revitalize" them. We cannot effect

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this with regard to protoplasm. Why? Because we know too little about its constituents and the energy which has left them. In the earlier case, we can trace a form of energy which has left the Hydrogen and Chlorine in the course of what is called the chemical action resulting in their combination. This form of energy, under the name of heat, we can apprehend almost as sensibly as we can the gases. It has left the gases just as has the "life"-energy left the protoplasm. We can collect the "heat" as it leaves the gases, and we can restore it to the acid so as to "revitalize" the gases. But we cannot collect the "life" and similarly revitalize the protoplasm. By no empiricism can we discover where this "life" has gone to. Emotional speculation offers us a number of affirmations on the subject, but, in these days, men are becoming desperately distrustful of their emotions. However, emotionalism itself involves response of matter and there may be an element of truth in emotional speculation which men (especially the emotional part of them) do not suspect.

We say that "heat" has been "generated" by

the combination of the two gases. How was heat "generated"? Suppose we say, again, that "heat" was caused by certain "mean squares" of Chlorine atoms intercepting other "mean squares" of Hydrogen atoms, our words to things are still in similar proportions to Falstaff's bread and sack. We here infer that the alteration of one sort of "motion" issues in another sort of "motion": that the Hydrogen and Chlorine atoms, before beginning to dance in sympathetic step, had several collisions which caused each to lose some of its initial vivacity. This loss we call heat. Supposing some such effects as these occur, it is evident that if the collisions of atoms or molecules cause them to part with something, that this "something" is distinct from the matter that parts with it. Suppose we impel one billiard ball against another; like the atoms of Hydrogen and Chlorine, the balls manifest different forms of motion: one involving displacement of mass; another, displacement of molecules; another, heat. Again, place the balls side by side; there they remain. What caused them, in the first case, to act so differently? Motion involving mass-

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displacement. But this was not "generated" by the balls. It came from the striker's arm, which, again, derived it from a number of other sources, the first of which was the cause of *all* motion. To find the origin of our stroke with the billiard cue, we must go as far back as to discover the origin of the molecules of the wood. Our molecules and atoms no more "generated" their motion than did our billiard balls, and we must find a first cause, or make a lame attempt to account for the effects. The First Cause of the motion of the atoms and the balls is, from our point of view, the Cause which generated *all* energy. In reference to this First Cause, we may incidentally draw the reader's attention to Matthew Arnold's researches on the derivation of the word "Being." This, with a qualifying adjective, seems to many Englishmen good symbolism of the object of their worship. Through Latin, Greek, Sanscrit roots; through the works of sages, poets, and philologists, the acute author of "God and the Bible" seeks his quarry. When he captures it, he finds it quite different from what we should suppose. This "Being" is identified

as the English representative of an Indo-European root, signifying "breathes." We Rationalists have no cause to be dissatisfied with the discovery. The term is appropriate to symbolize the method of the Supernatural of Science. The First Cause "breathes" and energy exists! Thus Science, with better cause than theology, may invoke tradition to authenticate her Supernatural!

No issue of empiricism and ratiocination is more conclusive to human perceptivity than that evolution is the method by which the universe has been and is being metamorphosed; that potentialities for every phenomenon lie in a predecessor; that every phenomenon is the inevitable sequel of an antecedent which, in its turn, was similarly related to a still more remote phenomenon; and so on, backwards, until we reach the first phenomenon which, again, we are trying to prove, must be the issue of the preter-phenomenal. This proposition, of course, eliminates what we call chance as a factor in any event, no matter how small, which happens in the universe. Some short time back I read a new philosophical system which propounded "chance" as the great factor in deter-



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mining the origin of the universe. Without being so enthusiastic regarding this assumed factor as is the particular philosopher, many people have a lurking regard for "chance" as the explanation of much that perplexes them. If they do not succeed in their attempts to gratify their aspirations, these people attribute the result to "chance": bad "luck" was the cause. (It may be remarked that men are not so eager to attribute their "successes" to this cause!) The author will have none of this "chance." He cannot escape the conclusion that, no matter how many alternative conditions may be apparently available, in reality there is but one. If the quintillionth and quintillion and first events were not as rigidly determined as the first and second, then would evolution appear a vain fantasy. Whether we assume one atom or billions as the first ponderable product of evolution, the one, or the billions, must have embraced all "chance" in its or their potentialities, and these potentialities must have been as rigidly determined in the pre-phenomenal energy or energies, until we reach the First Cause of energies. The greater must include the

lesser: all potentialities must be included in the first potentiality. If "chance" were a factor, all potentialities would not be included in the first. But whence could the new one arise? Not through evolution. Then we must discard evolution or "chance." In "Against Dogma and Free-will and For Weismannism," I have endeavoured to eliminate "chance" as a factor in human actions. The faculty which could enable organism to act, not as a responsive, but as an initiative agent would demonstrably involve "chance" as a factor. The doctrine of "free" will is now demolished and men must reconcile themselves to the fact that they are automata. The conception of "free" agency was, of course, a product of evolution, and therefore, we must assume, was essential in the cosmic scheme. Like many another product it has now done its work. Nature remorselessly exterminates its decrepit agents!

Scientists divide energy into various categories. This division is purely arbitrary. Professor Balfour Stewart prefaces a list of energies with these remarks: "We are now in a position to enumerate

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the various kinds of energy which occur in nature ; but, before doing so, we must warn our readers that this enumeration has nothing absolute or complete about it, representing, as it does, not so much the present state of our knowledge as of our want of knowledge, or rather profound ignorance, of the ultimate constitution of matter. It is, in truth, only a convenient classification, and nothing more." His list of energies comprises :—

*Energy of visible motion.* (Displacement of mass, such as movement of planets, cannon-ball.)

*Visible energy of position.* (Mass-potentiality for displacement, such as poised stone, bent cross-bow, wound-up watch.)

*Heat motion.* (Energy absorbed by molecules from outside sources: such as steam in boiler.)

*Molecular separation.* (Energy causing molecules to increase their distance from one another: gas expansion.)

*Atomic or chemical separation.* (Motion affecting the constituents of molecules: atoms, causing them to form new molecules.)

*Electrical separation.* (The "attraction" between

certain atoms causing them to dissociate from others.)

*Electricity in motion.* (The "current.")

*Radiant energy.* (Motion of luminous and obscure rays through ether "particles.")

I will, later, try to show that "particles" of ether involve a futile assumption, unless the term be applied on my conditions.

To the above list might, from the same point of view (which, the reader will observe, is not mine), be added :

*Nerve energy.* (Motion imparted to protoplasmic molecules through air and ether, involving sense-perceptions and ideas.)

*Muscle energy.* (Motion imparted to protoplasmic molecules through other protoplasmic molecules.)

*Psychical energy.* (Derived from nerve-energy, involving intellectual and emotional products.)

It seems a "far cry" from the vague speculations of Gilbert of Colchester (*circa* 1570) to the precision of a Balfour Stewart, a Tait, a Thomson, or a Clerk-Maxwell—from *Phlogiston* and *Caloric* to the latest conclusions of Thermo-dynamics, but, with

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all our vast experimental and mathematical achievement, we are apparently not very much nearer the ultimate facts of phenomena than was Gilbert of Colchester. Indeed, I am doubtful whether the quasi-spiritual, mystical conceptions of heat, light, electricity, entertained by the fathers of physical science were not more in accord with fundamental facts than are the purely mechanical ideas of several modern physicists. It seems to me that before we can make much real progress towards the ultimates of evolution, we shall have to renounce the conception of energy as a property of matter and candidly accept the assumption of matter as a property of energy. A great drag on science, nowadays, is the aversion, in relation to phenomena, to transcend mechanical speculation. Our forefathers were handicapped by mysticism; we are thwarted by a fear of the supermechanical. Professor Stewart's comment on our knowledge of matter and energy will probably hold good until we have altered the scientific standpoint with regard to the supermechanical. Only through this change of front shall we attain a practical synthesis of the manifestations we call life, light,

heat, electricity, sound. Until we have such a synthesis we shall have to reconcile ourselves to the melancholy confession of "profound ignorance of the ultimate constitution of matter." At present, on this question, we are in much the same position as was the old phrenology with regard to the facts of cerebral action. In respect to matter and energy, we are investigating "bumps" instead of nerve-centres. Energy is to physics, what nerve-centres are to scientific psychology. Physics is now a well-developed youngster quite able, without injury, to assimilate a course of supermechanics. In my opinion, scientists will ultimately have to adapt their theories to some such evolutionary *schema* as the following :

*First Cause.*

*Method* : Evolution.

*Issue.* Energy: the ether of supermechanics, an immateriality containing in combination all potentialities manifest in matter as life, light, heat, electricity, sound.

*First stage of evolution.* Matter : equivalent to the ether of physics. This is supermechanical



energy existing as materialized and specialized analogues of its own potentialities, in the form of particles endowed with rhythmical periods as the analogues of the "potentialities."

*Second stage of evolution.* Integration of the former, constituting the equivalents of the atoms of chemistry. These are endowed with fixed rhythms corresponding to, but, corollarily, more complex than those of the former.

*Third stage of evolution.* Reciprocal activity between two or more of the above constituting the equivalents of the molecules of chemistry and physics. These molecules have fixed rhythms, equivalent to the "mean free path" of molecular physics, and by reciprocal actions analogous to those of the preceding stage, cause mass-matter to issue.

The above assumptions imply that all conditions are foreshadowed in the ether of supermechanics, as are all the conditions of organic development, in the germ-plasm: the universe being thus an

organism developing under evolutionary conditions. This involves an embodiment of the incorporeal. If it involves metaphysics, it is metaphysics established by physics. Call it what we may, it is, at present, the inevitable inference from facts. When facts give a contrary verdict, will be the time for practical men to sniff at the metaphysic? Personally, the writer cares little about names, but is strongly responsive to things. On their authority he is even prepared to affirm the trinity of theologians! The assumption of pre-adumbration in the ether of supermechanics of all conditions affecting matter may seem hard to reconcile with our ideas of "time" and "space." But we must remember that these are but subjective nothings analogous to the unseen radiations and unheard undulations which we call "black" and "silence." They are parts of the cosmic "spectrum" beyond our ken.

On the other hand, the idea of projection of conditions from the immaterial to materialized mediums is no more difficult to grasp than the hypothesis of physicists with regard to the collaboration of "energy" and "matter." Indeed,



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we doubt whether any physicist has really grasped this hypothesis!

All matter is supposed to act on the "give and take" principle with regard to radiation through ether. Thus ensues what is called (Prevost's theory) "a movable equilibrium" of temperature—a continuous circulation of radiation throughout the universe. Presumably, on this hypothesis (the amount of energy being contained and consequently constant), the universe is limited. Then the "radiation" must have had an antecedent. What? A certain amount of energy is there. How did it get there? How did the matter which is perpetually exchanging its energy get there? The energy cannot be matter, for the latter "gives and takes" the former. Energy, not being matter, what is it? Immateriality? This, physicists of the mechanical school will not allow. They have a dread of immateriality. Again, what caused matter's integration? Itself? Then matter must be energy and have begun giving and taking itself. But physicists of the mechanical school will not have matter, energy! Then they must face such points as these, or emulate those emotional

specialists who toss logic to the winds when it offends their susceptibilities. Energy must be either matter or immateriality. According to physics, it is not matter. Then, *according to physics*, it is immateriality: the product of a super-mechanical factor.

No statement appears more conclusive to human understanding than this: within mechanical conditions, there can be no effect without a cause, and every cause is an effect. If the universe exists solely under mechanical conditions, then there must be a mechanical cause for every effect, but no First Cause can exist as part of the, or the whole, universe. Such a mechanical cause is inherently, not merely inconceivable, but impossible, on the mechanical assumptions of "matter" and "energy." It is not a question of mere want of experience of phenomenal manifestations. However much further we progress in this direction we must project our First Cause beyond matter. Then, the universe cannot be infinite or can our First Cause be mechanical.

The mechanical school tell us that the assumption of motion apart from something that moves

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is inconceivable. We answer: so also is the assumption of matter as self-evolved, or infinite. On the other hand, because an assumption is outside the scope of our apprehension, does not preclude the possibility that no other assumption is logically available. We assert that the assumption of an initiative energy apart from matter is not a jot more inconceivable than the assumption of self-evolved, or infinite matter. Assuming that all physiological manifestations issue through the agglomeration of primitive matter-systems, we maintain that no mechanical hypothesis will account for such agglomerations. The ultra-Materialist, while contending for a mechanical origin, tells us that organisms originated through "chemical" combination. This is begging the main question. We want to know what is this "chemical" combination and whence *it* originated. We know how wonderfully effective are words to conceal things. We surmise that this word "chemical," in its materialistic application, is one of those symbolic impostors. If we endow primordial atoms with the capacity to "chemically" combine, we thereby concede that the

combination is not a mechanical process. Chemical combination effects the transmutation of matter. Mechanical combination involves no transmutation. Then chemical combination cannot be explained by a mechanical hypothesis, and, corollarily, the evolution of matter-systems cannot be so explained. Assuming that atoms were self-evolved—an inconceivable assumption—no mechanical hypothesis can explain how these atoms could combine into matter-systems. If mechanically energizing, these atoms would constitute mixtures, not chemical combinations. On the other hand, if these atoms energize “chemically,” and, accordingly, not mechanically, we ask the ultra-Materialist how he intends to escape the admission that they energize super-mechanically? Mechanics can tell us much about the energy of a head of water. Mechanics can tell us nothing about the energy which causes 16, but not any other number of parts of oxygen to select 2, but not any other number of parts of hydrogen, to form the water. We shall have much to say, later, respecting atomic and molecular selection. The facts and deductions

to be offered, we trust, will render apparent the utter untenability of a mechanical evolutionary hypothesis. The mechanical school, again, tell us that by importing a First Cause, we merely add another mystery to the mystery of matter. We reply, as we do to him who scouts energy apart from matter, because he cannot "conceive" it: if the facts we can conceive irresistibly drive us to infer what we cannot conceive, then we must either follow reason, or act as do the "orthodox": we must strangle reason. In this volume, we purpose showing that facts we can conceive irresistibly drive us to those we cannot conceive. With rational evidence to confirm it, we will believe anything, from a six-days' "creation" to "Jack and the Beanstalk." With rational evidence to discredit it, we will scout anything, from the assumption of self-evolved atoms to that of an honest "party"-hack.

### *Résumé of Chapter I.*

All science is based on the assumptions of energy, ether and matter. Motion typical of

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energy. Motion considered in connection with something that moves. Lord Kelvin's hypothesis of the origin of matter. Preliminary consideration of a perfect medium. Germ-cells and embryonic development. Abstractions to be practically useful, must not be projected far beyond the scope of sensual perceptivity. Forms of energy interchangeable. Organic life analogous to other forms of energy. The functions of matter not initiative, but responsive. Preliminary reference to the hypotheses of an infinite and finite cosmos. The "death" of organic and inorganic matter compared. Motion something distinct from that which moves. Illustration. First Cause of motion. Derivation of the word "Being" in connection with a First Cause, shown to be appropriate to the supernatural of Science. "Chance" considered in connection with evolution. Shown inadmissible as a factor. "Freewill" would involve "chance." The categories of energy according to physics. Additions by the author. The writer's hypothesis in respect to the scheme of evolution. Super-mechanical factors. Origin of energy and atoms.

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Ether. All evolutionary conditions foreshadowed in the supermechanical ether. "Time" and "space" considered as abstractions. Prevost's theory of a movable equilibrium of vibration. Energy and matter on the mechanical hypothesis. Shown to involve the supermechanical. Cause and effect. Motion apart from something that moves. Inconceivable assumptions. Chemical combination and mechanical mixture. The inconceivable deduced from the conceivable.

## CHAPTER II.

### PHENOMENA AND A PERFECT MEDIUM.

IN the foregoing chapter we have tried to prove that science cannot dispense with the fundamental assumption of a supermechanical energy as the cause of matter and all phenomenal manifestations. We shall now try to show that even *on the mechanical theory*, a "perfect medium" composed of matter is as much an impossibility as is a mechanical First Cause. We shall try to prove that all manifestations issuing in what we call light, heat, sound, life could not be propagated through such a medium, even according to the purely mechanical hypothesis itself. We have already casually noticed some of the phenomena now to be examined, but more with reference to energy than the medium, or ether.

According to physics, light is wave-motion conveyed through ether. Ether is assumed to be an exceedingly tenuous fluid permeating the



universe and the minutest particles of matter. Let us for the moment ignore the issue that ether is, if a fluid, still matter. For us, the great source of light is the sun. We have no analogous source of sound; any phenomenon causing concussion of air-particles can cause it. According to physics, sound cannot be propagated through ether: only air can convey it. Thus, we must assume it a more localized manifestation than is light. But we intend to show that, in contemplating sound merely in relation to air, we do not reach its origin: equally with light, it must issue through the ether. To this point we shall return. Two main modes, only, of motion are known: one, immediate, causing mass displacement (visible motion, as of a cricket ball); the other, mediate, involving displacement of the minute elastic particles composing mass. Immediately after extraneous agitation, these particles revert to certain inherent motions with which they are endowed; but they communicate the extraneous impulse to adjacent particles which similarly respond, *ad infinitum*. The result is a backward and forward motion of the medium which these

particles compose. Now, let us look a little more closely into this distinction between mass-movement and movement of particles. A great deal hangs thereon. Let us suppose, in one case, two ivory balls moving visibly through a certain elastic medium called air; in another case, highly elastic particles endowed with proper motions and receiving beyond these an extraneous impulse compelling them to transiently exceed their natural limits of motion. So soon as they do this, they at once infringe on the fields of motion of other particles to which they transfer the extraneous motion and then return to their own normal condition. Let us suspend our two ivory balls, which, we will suppose, are of unequal size, from lengths of thread so that the balls when at rest lie close together. If we raise the smaller and then let it fall against the other, the larger is set in motion and the smaller rebounds in the opposite direction. If we, another time, cause the larger ball to strike the other, the larger, instead of rebounding, will slowly proceed in its original direction, after the smaller ball. If both balls are of equal size, the striking ball will, on

impact, come to rest, the other appropriating the motion. In regard to light and sound, we attribute analogous effects to invisible elements. In the case of light, we apply them to particles of ether: in the case of sound, to particles of air. But, whether we deal with particles of ether, air, or the balls themselves, we have a factor which is neither ether-particle, air-particle, nor ivory ball. This something is the motion. If we assume that the proper motions of the particles are part of their essence, we cannot assume this of the extraneous motion. And, as we cannot assume it of the latter, we have no right to assume it of the former, until we can demonstrate their *essential* difference. If the particles of ether which give us the sensation of light are, as much as the particles of air through which we perceive sound, material elements, then all analogy compels us to assume that the former, as much as the latter, have fixed motions. Having conceded motivity to the molecule of air, we have no logical ground, and absolutely no empirical, to deny it to the ether particle. Then, we must assume that ether particles have fixed rhythms of motion. Conse-

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quently there must be a medium in which they can move. If this medium is composed of smaller particles, we must simply carry back a step further the same process of reasoning, so that ultimately we come to a "medium" which is either all "matter" or all void. If we have a "medium" all "matter," then the ether motions assumed by physicists are impossible, because there are no particles with free motivity to convey them: all is mass. If, on the other hand, all is void, then we get nothing as the ultimate of something, and we fly in the face of the fact that motion, if a mechanical effect, could not be conceived to pass through it. On the other hand, the latest theory of ethereal vibration (Huyghen's, revived by Young) commits science to the assumption that light is motion conveyed through void between ether particles. I cannot understand why, on the mechanical hypothesis, it should be conveyed a billionth of an inch through void more readily than a billion miles. Moreover, if light is so conveyed, the assumption of the ether of physics is superfluous: we need nothing but matter and void. Then, motion, not

being matter, must be supermechanical. We have, in Huyghen's theory, a plain statement that something is conveyed that is not matter, and that ether is not homogeneous, merely differing from other integrations in the minuteness of its own. Thus there is an absolute "somethingness" which these particles transmit, but which is essentially different from themselves, and an absolute "nothingness" through which they transmit it, and which is, again, distinct from the "somethingness" or the particles. Talk about hypostatic unions, this would be the emperor of the series! The "mechanical" specialist may here advance a counter-proposition. He may say: If this supermechanical theory is accepted, we grant all that mysticism demands; we need no evolution. The supermechanics which assumes such a factor may as well surrender to "miracle"; we may as well accept the "six days" product of tradition. This might be valid reasoning had we no evidence that the "six days" product is against experience: that evolution *is* the principle on which the universe has come into existence. It is futile to argue

about what might be, when we have overwhelming demonstration that what might be is not what *is*. Human brains are often admirable machines, but their "might be" is of small consequence against nature's "*is*." So soon as we have evidence equal to that for evolution, showing that a purely mechanical theory will account for energy and matter, we shall, of course, be compelled to accept that theory. In the meantime, all the evidence we do possess is to the contrary. So we must reject the purely mechanical as decisively as the purely mystical. Traditional "miracle" is, according to evidence, a ludicrously parochial affair compared with the facts of evolution. But, because truth is here stranger than fiction is no reason for crediting fiction. The experience of effective cerebral machines must, in these days, predominate over that of ineffective machines. The latter are, in these days, the brains which prefer their own eccentric responses to logical inference from sense-perceptions common to humanity. Extreme examples of such tendency we call insane. Whether we are right in doing so, of course depends on the

character of normal brains. Were our insane types the majority, we, who are now the sane, would have to play their *rôle* in the drama of life. It is all a question of survival of the fittest, the fittest being that which best conforms with its life-conditions. Mysticism was once in this position. It is still making a feeble attempt to preserve its pet illusions. Materialism is, no doubt, quite as innately prone as is mysticism to nurse its pet illusions. But it is differently circumstanced. Its facilities for exercising solicitude are strictly limited by sense-evidence. This conditions the existence of materialism, so it discreetly tempers its devotion. Emotionalism existing in defiance of evidence, coddles as it is inclined. On the mechanical hypothesis, we have no escape from the conclusion that a "perfect medium" involves impossibility, just as does a piece of hard granite that is as elastic as india-rubber: the result of the assumption is a contradiction in terms. The moment, in respect to such a medium, we import the conception of ponderosity—no matter how infinitely we divide the ponderable—we destroy the mechanical

conception of a perfect medium: we then get a medium which is imperfect. Then, our superstructure of deduction from experience falls. On the other hand, if our ponderable medium is the analogue of an immaterial one, the former is then logically available for our theories of phenomena. We may then rationally account for the primordial vortex-systems of Lord Kelvin or some other analogous effect, as the first differentiation of the first ponderable product of evolution. Thus we start with matter as a property of energy instead of energy a property of matter. All organic and inorganic structures are equally derived mediums from materialized energy. This materialized energy we may compare with Weismann's "biophors" which evidence compels us to accept as the prototypes of "living" entities. In assuming our materialized energy, we do no more than apply the conception of "biophors" to all phenomenal manifestations of matter. The particles of our materialized ether are each an analogue of some potentiality of the ether of supermechanics. Thus, the effective energy of each materialized ether-particle throughout all stages of evolution is



duplicated in the original energy, and no product of evolution can act otherwise than according to its pre-ordained dispensation. Consequently, in considering any organic structure a "free-agent," we at once import a factor outside our system and we remove the particular organism from our category of mediums. But it is demonstration that all the organisms, to which some of us attribute this "freedom," are mediums like the rest.

We have now reached two fundamental assumptions: a supermechanical energy and an immaterial ether as its first issue. The first product of cosmic evolution we assume as points of ponderable (in contradistinction to immaterial) matter, each endowed with rhythmic motions which it will preserve so long as the universe coheres. These material points we call ether-atoms. The next analogue of immaterial potentiality to appear, is reciprocity in rhythm between differentiated ether-atoms. The issue we call a matter-atom. A similar reciprocity between differentiated matter-atoms (equivalents of the atoms of chemistry) results in compound

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matter-atoms (equivalents of the molecules of physics and chemistry). Proceeding on this principle, an ever-increasing complexity of co-operating rhythms results in all phenomenal integrations, each of which must have its analogue in the primordial energy. This is in accordance with Mr. Herbert Spencer's formula with regard to evolution: "Evolution is an integration of matter . . . during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity." The primary incoherent homogeneous matter is the ether of points, of which the rhythms, representing potentialities of the immaterial energy, are commingled so as to constitute this matter-ether a chaotic whole. We may compare this with the "resting stage" in the process of nuclear division of germ-cells. Here, the constituent loops containing ordered arrangements of "ids," or hereditary elements, break up, and the "ids" appear to be indiscriminately mixed. After this, the loops re-form and a new stage of metamorphosis ensues. (See "Against Dogma and Free-will and For Weismannism.") The primary "coherent hetero-

geneity" of matter is represented by the reciprocal affinities of these ether-atoms, causing their rhythms to co-operate and form systems. Each new system involves a greater coherent heterogeneity of rhythms. Thus, if we assume the First Cause of energy to typify, as perfect coherency, all the heterogeneities (potentialities) combined in primordial energy, we gain a more reasonable conception of Deity than any current theories can afford. This seems the nearest possible approximation to a rational definition with regard to Deity. On this hypothesis, we may consider evolutionary changes to tend to higher degrees of perfectibility. The more complex the heterogeneity of the coherent becomes, the closer it approaches perfect coherency. Two shining lights of science, in criticizing the work of Herbert Spencer, have tried to cast ridicule on the above apparently formidable abstraction. Nevertheless, the writer ventures to assert that it expresses, in a few words, one of the most important truths within the apprehension of humanity, and that the more we know, the more fully we shall recognize its significance.

We have assumed various primordial agglomerations of matter as issuing through the aggregations of ether-atoms. Has the process of agglomeration of primordial matter ceased? We may ask the same respecting the evolution of ether-atoms from primordial energy. Of course it is futile, in the present state of knowledge, to affect solving such questions. If the emanation from energy of ether-atoms were a fixed quantity, the universe would be composed of that quantity, and so many as went towards mass-agglomeration would be lost to the ether. (The first stage of mass-agglomeration, it will be remembered, are the atoms of chemistry.) If this process of mass-agglomeration from ether-atoms continued *ad infinitum*, a period would arrive when there would be no ether. According to the mechanical hypothesis the present dispensation could not exist under such conditions because energy could not be transmitted. We shall, later, give further consideration to the ultimate phases of evolution, which, on our hypothesis, is assumed to proceed from a *perfect*, definite, coherent heterogeneity. The first emanation from this First Cause is a

*relatively* (with regard to the First Cause, but absolutely, with regard to the universe) perfect, definite, coherent heterogeneity: energy. From this issues an indefinite, incoherent homogeneity: matter, or the equivalent of the ether of physics. We have here an ante-cosmical process of emanation issuing in an immaterial entity: the supermechanical ether, or energy, the heterogeneous potentialities of which are so conditioned that the issue is a coherent whole: an organism, if we may apply the term to immateriality. As this immateriality is an inevitable inference from our experience of the material, there is here no misapplication in the term, which science, without hesitation, uses in connection with assumed material elements—biophors, atoms, molecules—no more within sense-perceptivity than, and as purely matters of inference as, the immaterial elements. This ante-cosmical, immaterial coherent heterogeneity (immaterial ether) may be assumed as the issue of a precedent immaterial, indefinite, incoherent homogeneity, the “germ-cell” of the immaterial ether-organism (thus varying the first assumption as to the initial

product of emanation). By a like strictly evolutionary process, there issues from this immaterial ether-organism the "germ-cell" of the cosmic, or matter-ether organism of physics. This "germ-cell," like its prototype of the immaterial ether-organism, is an indefinite, incoherent homogeneity. Repeating the process, this matter-ether "germ-cell" becomes the matter-ether organism of physics: a definite, coherent heterogeneity. From this has already issued the universe as we know it, or think we know it. Whether we are to consider the universe as having entered the stage of definite, coherent heterogeneity as a "mind"-organism, or still to be in the state of indefinite, incoherent homogeneity, as a "germ-cell" of a "mind" (or any other type of) organism, is a matter for dialecticians to settle. In the meantime, the plain student of fact may affirm that every stage of evolution is pre-ordained: that the most infinitesimal, as fully as the most stupendous effect, apparent to our perceptivities must have its prototype in the primordial immaterial energy or ether. Thus we exclude as possible factors of

evolution, such effects as we attribute to "chance" and "free-will." There is no room for either in the cosmic scheme. So soon as we import one or the other, we merely add another factor to the primordial energy, thus stultifying our conceptions of the assumed factors. Mass-matter representing progressive integrations of matter-ether points, and such integrations involving co-operation of the rhythms of these ether-points, which rhythms, again, represent potentialities of the immaterial energy, it follows that, the more complex the integration, the more potentialities it will represent, and, assuming that coherency corresponds with the complexity, the nearer perfection that integration will approach. If we apply this to organic matter, we find that experience confirms the hypothesis. Protoplasm, so far as experience carries us, is the most complex integration of matter, and we must consider protoplasmic matter-atoms as differentiated by complexity of their constituent ether-atom integrations from other types of matter-atom. Again, as all matter-ether points represent by rhythms of motion their analogues in un-

materialized energy, we must assume that, where free ether-points impinge on those which have become fixed as parts of a system, whether involving the integration of matter-atoms only, or of mass-matter systems, the corresponding rhythms of the free points and imprisoned atoms will be mutually excitative. Will this involve the amalgamation of the free with those of the integration? No. Otherwise, we must assume incessant modification of atoms, which being systems, are unalterable. What applies to the germ-cell we may reasonably apply to a matter-atom, or any combination of matter-atoms, until experience compels us to do otherwise. Biology tells us that, only from one unalterable cell, can an organism issue. In this cell only exist the potentialities (rhythms) for all succeeding (somatic) cells. These potentialities (rhythms) were originally life-atoms (biophors). These biophors are more complex equivalents of the matter-atoms which compose elementary inorganic matter. Both life matter-atoms (biophors) and inorganic matter-atoms are organisms of the primordial stage of cosmic



evolution. They are systems, each member of which preserves its functional integrity with respect to rhythm. Any excitation of one member of such a system excites the rest, and any unit of the system is excitable by a corresponding free atom in the ether. How the rhythms of a free ether-point affect those of a system through a corresponding unit of that system, is probably roughly illustrated by the action of electricity on nervous elements. Something analogous may be reasonably inferred with regard to the free and imprisoned atoms. The simplest integration would involve inconceivable multitudes of impacts, every moment, between free and imprisoned atoms. How much greater must be the number in the most complex system, nervous matter, we will leave the imagination of the reader to decide. We may, however, reasonably affirm that the number would be adequate to account for every responsive effect manifest in human thought and action. But, some may ask, How can we conceive motion of atoms to issue in consciousness? I will later consider the question; in the meantime, I reply:

The question is not what we can conceive, but, to what do ascertained facts drive us? Facts tell us that molecular nervous movement causes consciousness and all its correlatives.

### *Résumé of Chapter II.*

Ether, if a fluid, still matter. Proposition that sound, like light, originates in the ether. The two main modes of motion. Mass-movement and particle-movement. Analogies. Motion distinct from the moving matter. Ether-atoms as much as air-molecules have fixed motions. Analysis of the mechanical assumption with respect to matter, the medium, and motion. "Miracle" and the writer's hypothesis. How insanity differs from sanity. Materialism, like mysticism, is prone to illusion, but controlled by sense-evidence. The "perfect" medium, on a purely mechanical hypothesis, involves impossibility. Matter a property of energy. Materialized energy compared with biophors. Each particle of materialized ether an analogue of a potentiality in the supermechanical energy. Mr. Herbert

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Spencer's formula *re* evolution applied to the author's hypothesis. The "resting stage" in the process of nuclear divisions of germ-cells. Ethereal "resting stage." The nearest approximation to a rational definition of Deity. Evolutionary changes tend towards higher degrees of perfectibility. The ante-cosmical process of emanation starts the evolutionary series. The matter-ether organism of physics. The mind-organism. The more complex the constitution of a matter-system, the more potentialities it will represent. Protoplasmic matter-atoms are differentiated by the complexity of their constituent ether-atom integrations, from other types of matter-atom. Free and systemic atoms mutually excitative. No amalgamation between them. Analogy from germ-cell. Organic and inorganic atoms are systems. Atomic motion and consciousness.

### CHAPTER III.

## RHYTHMS AND SYSTEMS.

It has been stated above, that the ether-atoms impinge on those imprisoned in systems, and that the issue is excitation of the system subject to the conditions. We must now make a further application of the biological proposition advanced in the last chapter, as answer to the question: Do the free atoms become parts of the systems on which they impinge, and, if not, why? Systems may combine with others to form more complex ones, but free units cannot enter systems; they can only originate and excite them. If they could, as integrants, enter systems, we should have to alter our theory of heredity (which, on our assumption, is as fundamentally applicable to inorganic as to organic integrations—the distinction between these being merely that of relative complexity of elements). Weismannism, in its fundamental propositions, is accepted by science as a logical deduction from facts. It has

established that no organism can be hereditarily affected by extraneous influences. The impingement of a free atom would be an extraneous influence. Consequently, it could not hereditarily affect the system. But, if it entered the system as an integrant, it would hereditarily modify it. If extraneous influence could be demonstrated to alter the biophoric constitution of the germ-cell, the whole theory would be discredited: in fact, we may say that the whole *true* theory of evolution would be discredited. We should then be unable to apply our hypothesis, from the fundamental proposition of a First Cause, onwards in logical sequence, to each new manifestation of evolution. We should then import "chance" as a factor, or involve ourselves in some metaphysical juggle to escape it. We cannot grant "chance" and retain evolution. No free biophor could become part of a cell-system. As a strange ant is ousted from the nest, so a "strange" biophor would be expelled from the system. No biophor could amalgamate with any factor except a free biophor. From such a union would issue a primitive system, which, again, amalgamating with another system,



would start a process of evolutionary permutation. Evolution must proceed, after two cosmic units have united, by unions of *systems*. It may be advisable to remind the reader that we are here dealing with the evolution of systems, not with the development of individual systems. Thus: an ether-atom is the unit of the system called a matter-atom (chemical atom). This, again, is the unit of a molecule; this, of compounds, and so on. Again, a biological biophor is the unit of a determinant; this, of an id; this, of an idant; this, of a germ-cell; this, of an organism. This means that all the constituent rhythmic correlations of every system are determined at the origin of that system, and that they can only be transiently affected by external influence: the rhythm proper to the system thus persisting so long as the system retains its integrity. The more units compose a system, the more transient excitations through sympathy with free rhythms will be experienced by that system, because the more free atoms will impinge on corresponding units in the system. This sympathy of rhythms may be illustrated by some physical experiences. The

following passage is extracted from my pamphlet entitled "The Supernatural of Science and Rationale of Socialism." "If we place a sufficient number of strings, or other vibratory mediums tuned to the same note, in proximity to an active source of sound, say a blown bugle, whence that note, among others, proceeds, we hear all the sounds except the particular note to which the other mediums are tuned. These mediums, as it were, absorb the particular note which, in causing them to sympathetically vibrate, loses its own energy as audible vibration. Similarly, certain dark (Fraunhofer) lines in the solar spectrum arise from the interception of his rays by substances which, when incandescent, give bright in place of dark lines. Analogously to the intercepting strings, such substances, in vaporous form, intercepting vibrations from the source of light in which these substances are incandescent, vibrate sympathetically, but affect sight as dark lines in the spectrum, thus being the analogues of the unheard note in the earlier illustration." We shall have occasion to make frequent reference to the above illustrations.

A biological biophor is an analogous system to a matter-atom (chemical) of inorganic matter. They only differ in respect to their systemic constitutions, the former embracing a greater number of ether-point integrations than the latter. It has been here advanced that ether-points are materialized potentialities of energy, appearing as rhythmic motions, and that all matter responds to ethereal excitation according to the number of ether-point combinations comprised in its systems. The issue, as regards the collective whole, is more or less complexity of internal motions. It has been further advanced that it is outside the question at issue to attempt to reconcile the subjective state of the collective whole with the objective phenomena: that this state tends to the grossest fallacy in the investigation of such phenomena: that the question is one of evidence entirely external to subjectivity. How, then, are we to account, on our hypothesis, for the above phenomena with respect to sound and light? The bugle blowing involves the transfer, through a vast series of systemic combinations welded into a collective whole, of an inconceivable



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number of actions and reactions. Before this collective whole can blow the bugle, his most complex sub-systems must be excited by multitudes of free atoms in rhythmical sympathy with those parts. Just as the strings respond, so must these parts. Before the collective whole can blow the bugle, he must desire to do so (of "desire," we shall have much to say later). He can have no desire unless precedent excitations have been aroused in his brain, say by hearing another bugler. Then, he must be compelled by other excitations to go through a complicated preliminary training in muscle-adjustment, which, again, involves a training of nerve-molecules to repeat, with facility, their acquirements beyond normal rhythm. Such acquirements are the product of ages of anterior response to external rhythms by ancestors of the bugler, and are transmitted, not hereditarily by the nervous systems themselves to their successors, but by the rhythmic system composed of men, which we may call a nation-system, preserving and improving on the acquirements of the individual system. The nation-system is as much an organic product of

evolution as is the man-system. The latter is to the former as is the cell-system to the man-system. The body is the cell's nation. The other cells react on their single fellow as the nation reacts on the individual. Such responses made by the individual cell to the rest, by man to his fellows, are, respectively, the effects of tutelage on the man-system and the cell-system. Such responses are beyond the innate functions of the respective systems: they are acquisitions, not hereditary endowments. They are the issue of extraneous influences affecting the individual system, but involving the evolution of no new systems. This leads us to an important consideration. If cell-systems, man-systems, nation-systems are all analogous and successive products of evolution; if extraneous influences are not hereditarily transmissible, but are, as it were, renewed and modified by successive individual systems, then, as well as evolution from within each system, there must be evolution from without. Does this contradict our fundamental assumption with regard to evolution? We stated that only by modifying the germ-cell could we

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hereditarily affect the organism, and we showed how the biological conception of a germ-cell was applicable throughout cosmical effects. Now this "germ" always begins to operate *before* the system (whether cell, man, or nation) is built up; while here, on the other hand, we have a factor which only begins to operate *when* the system is built up: nations, men, and (inferentially) primitive cells being modified from without. We are now dealing with what naturalists call environment. How are we to account for this new factor on our hypothesis? Putting aside cells, men and nations are undoubtedly moulded by environment. The only inference the writer can draw from the facts is that we must simply enlarge our purview: that we must accept as equally evident truth, that nations are as much organisms as are men; that the evolution of both is now simultaneous; that when the evolution of communities began, a different factor began to energize from that earlier involved in mass-matter evolution. Or, rather, we may say, a fresh manifestation of energy occurred. Then, if nations are organisms, it may be asked: where, with

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regard to them, is the "germ," the *point d'appui*? We reply that it is in the free-ether whose rhythms decide the *average*, or collective efficiency, of men's thoughts and actions. This decides the evolution of the world's mind, as distinct from its matter. The rhythms of matter-systems are dominated by those of the free-ether. This is the "mind" of energy. We see the effect of this "mind" in all the great movements which have modified and are modifying societies. We see men the blind instruments of its purpose. We see them wildly fighting for issues they cannot fathom—which lead they know not where. We see them selfishly intent on their own petty ends, and these ends frustrated by the very means adopted to further them. Witness the present Socialistic movement, accelerated by one set of moneyed "party"-jugglers trying to outbid another for the very votes which are to send them both to the whipping post! See how they have bared their backs for the cudgels! Recent achievements of both "parties" convince the writer that evolution is getting tired of "party" government in England.

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We thus see this "mind" of energy regulating the average of men's, nations', the world's thought. We see the stupendous symmetry of evolution—how, from the worm to the monarch; from the atom to the universe, every product of evolution is equally under inflexible control. At the end of imagination's vista, we may discern blurred outlines which each will interpret, as optimist or pessimist, according to his idiosyncrasy. According to my hypothesis, evolution tending to higher perfectibility, I am naturally an optimist in respect to the end, though the intermediate stages within my purview tend to damp my satisfaction. In this organization of the matter-ether into the "mind"-instrument of energy, we have the consummation of Mr. Spencer's formula applied to the matter-ether. First, we had it as the primordial manifestation of homogeneous, incoherent matter: the ante-cosmic ether. From this issued, primarily, the cosmical series eventuating in mass-matter and its progressive mutations to the ordered state we now perceive in phenomena; then, the organization of the residue of free-ether into the "mind"-

energy, modifying societies and, corollarily, individuals, by environment. What we call the artificial "selection" which determines the "fit" for civilized communities and thus controls social evolution, is the effective energy of the ether-"mind." This decides the averages of human thought. These averages represent the direction in which evolution energizes with respect to societies which, again, represent the development of the world's "mind." We shall, later, afford, what we consider, conclusive evidence for these propositions.

The mass-matter of the universe, constituting individual sub-systems of the universe-system, is, on the other hand, controlled by what is called natural "selection." This preserves those sub-systems, the functional activities of which best enable them to thrive under what we must call their mass-matter environment. Thus we have two forms of environment corresponding to the two main metamorphoses of the ante-cosmic ether, and both, if we may judge by appearances, competing for universal dominion. The one seems to tend to eliminate what the other would

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preserve. To distinguish between these two classes, we will call one the mass-matter, the other the mass-mind, environment. In what we call civilized communities, we everywhere see the latter dominating the former; everywhere we see "mind" vanquishing "matter" in the life-struggle. The ultimate issue of the struggle between the two environments would seem, to the writer, to involve the triumph of mass-"mind" and the evolution of a coherent man-system under some such conditions as are represented in the Socialistic ideal. Humanity, in its final evolutionary aspect would then appear as a definite, coherent heterogeneity. Beyond this, it would perhaps be vain to speculate; but so far, we may assert, experience carries us. If we examine the evidence offered by the various branches of research bearing on the subject, we shall find that the tendency of evolution is to a consistent process of elimination of the "brute" type. This, of course, needs little asseveration with regard to humanity. Our common experiences are daily impressing it. But, also, in the animal, as distinct from the human type of organism, we

may notice a progressive tendency to more coherent heterogeneity involving superior "mind" faculty. We cannot reasonably doubt that the process will lead to future evolutionary issues utterly beyond the scope of present human apprehension.

Let us now revert to our illustrations. Our bugler has blown us a long way. Let us make another speculative start from his little individuality. We may assume that he is not a very important member of his community; he is not a Prime Minister, or even a mayor, or beadle; yet, we may also assume that, could his innermost subjectivity be probed into action, it would proclaim the bugler as the most important unit in this cosmic scheme! Most of us emulate this bugler in regard to our subjectivities; and, like him, in regard to estimation of "self," keep our subjectivities under lock and key. We are so careful to do this, that an unsophisticated observer would suppose that our whole object in life was to play Wackford Squeers over our poor selves. On the other hand, were this observer sophisticated in the ways of human nature—an observer of types



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and origins as much as of units—he would attribute this Squeerish tendency to the environment and not to the innate proclivities of these units. The mass-“mind” turns all of us into hypocrites—at present. If we may judge by symptoms, this mass-“mind” is about to turn us into honest men. When this is achieved, we shall still play Squeers over ourselves, but, from innate proclivity as well as from environment. We shall then know too much to be hypocrites. At present, knowledge has not, apparently, a pronounced tendency to render us honest; in fact, it seems to help a number of us to be very profitable (to ourselves) humbugs. The reason is, we have not enough of it.

Now, let us see how this bugler became an egotist by nature and a modest bugler by environment. He started his career, as a mass-matter system, in the form of a complicated structure called an egg-cell or ovum, which, itself, had previously passed through many developmental experiences. This egg had previously been penetrated by an enterprising particle of another cell, called a spermatozoon. The issue of their

collaboration was a tremendous disturbance in the internal economy of the egg. This disturbance was caused by progressive irruptions into a special part of the cell of innumerable inconceivably minute points of living matter called determinants, because they are proved to determine the course of the coming-events in that egg. These determinants are themselves matter-systems: the first mass-matter systems issuing from the combination of vital units, or biophors (the analogues of the matter-atoms of chemistry). These determinants had hitherto lain dormant in the nucleus; but, the time arrives when their "chrysalis" state must end, and here they are, as vivacious as butterflies! Who can tell what tremendous conflicts are going on in that egg? Why should we, the products of such conflicts, measure them by our perceptivities? Why should we pose as the only Brobdingnagians of evolution? As resolutely as ants, these determinants set about evolving order out of chaos: a definite, coherent heterogeneity from an indefinite, incoherent homogeneity. In about forty weeks, the product of these exertions (for particulars of which, see a

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treatise on embryology) emerges into daylight as a few inches of pulp. The first thing this bit of pulp does, under the unaccustomed circumstances, is to squeal, or make its best effort in that direction. However small its success at first, the pulp soon becomes a very efficient squealer. We don't, later, consider this acquisition much to brag about, but, at the particular time it is first practised, there can be no doubt that its most vigorous squeak is a matter of great moment to the pulp, inasmuch as it is thereby compelled to take its first lungful of air. At this stage of his existence, the future Bismarck, or, let us say, our supposititious bugler, is "very small potatoes." A chicken of the same experience is, comparatively, "a man about town." Soon, one among the circle of admirers of the newly arrived pulp, applies its putty (not intended for pretty) nose and button mouth to its mother's breast, with the consequence that "pulp" acquires another accomplishment which he will probably be more willing than permitted by circumstances to practise through life. Soon, "pulp" adds to his acquirements by differentiating his squeak into an

approximation to "ma," which means, for him, something to suck, or, perhaps, nothing in particular. "Ma," however, thinks it has special reference to herself, and considers "pulp" an appreciative duck. Now much hangs on this exclamation of "pulp," or, as we may now call him, "chubby" (if "ma" gets her dinner when she wants it). Many wise men have cudgelled their brains about "chubby's" exclamation. Reams of paper have been covered with theories it has started. What it really is, has only comparatively lately become known. It is the product of movement of particles in "chubby's" matter-system, or rather in the matter-system called "chubby." These particles are molecules, the issues of the third stage of evolution, according to our hypothesis. Certain movements within the "chubby" mechanism involve "ma" as their correlative, just as they will later, if "chubby" blossoms into an average M.P., involve twaddle; or, if he becomes an honest "have-not," involve a desire to improve society by a redistributive process. These movements act on "chubby's" subjectivity much as does a drop of sulphuric acid

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on a piece of phosphorus: they set "chubby" ablaze; only his blaze is not like that of the phosphorus; it is the prototype of what we call desire (for which, by-the-by, imaginative writers have sometimes applied flame as a figure). Now, it may be asked, if the molecular movement involves desire, what is desire? We answer that it is a word, and that words are symbols often employed to designate what has no longer a rational connection with experience. Many fanciful notions are current with regard to the word desire, in its present connection. Metaphysicians have fought about it as dogs do about a bone. It is the business of metaphysics to nicely discriminate regarding symbols of superseded physiological conditions. We prefer dealing with symbols of the physiological states which have superseded the above. These are determined by experience. We have only to study old and current meanings to realize this. The meanings have changed because our conceptions have changed, and the change of conceptions has issued from change of environment. As an instance, let us take the word

inspired, in its antique and modern theological applications. No rational and informed cleric, let alone layman, now conceives the same inspired gospels as did his forefathers. His physiological state is changed. His molecular movements are different under the stimulus of the same objective realities. The gospels are as they were. He is different from the men who, a century ago, responded to tradition. Environment is the cause of the difference. Not only do men of different periods manifest such mutations of state. Each of us is daily, momentarily, manifesting them. We cannot always measure them, but science tells us the facts, just as it tells us the facts of ether-motions beyond sense-perceptivity. Does a man ever respond twice consecutively to the same stimulus by absolutely the same sensation? Does the octogenarian respond to the word cricket, as he of twenty? Do any two men ever respond in an identical manner to the same stimulus? We answer emphatically, no, to all these questions. Then, what is the use of symbols unless we conceive them according to the average of the

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continually changing experiences of mankind? Why do we alter, according to experience, the meanings attached to some symbols, and retain other meanings in defiance of experience? The answer is: because our physiological states change more rapidly in one than another direction: that certain cerebral correlations involving what we call attention or intelligence are more readily impressed by experience than are others causing the muscular actions involved in symbolization, and, that through this lack of uniformity, the more sensitive response is nullified. Now, in regard to this word desire, the physiological states controlling the symbolization it involves have entirely changed within the last twenty years. We find that all the introspective hair-splitting practised to decide between volition and automatism, between consciousness and unconsciousness, is merely a matter of discrimination between "tweedle-dee" and "tweedle-dum," and is based on the tradition of ignorance, and practised to uphold certain ethical and mystical superstitions. Our conception answering to that symbol must now involve different molecular

states from those excited by the symbol, in our grandfathers. We must reject experience or submit to this condition. We are now compelled to realize that all subjective states, whether they involve ideas, sensation, or mere reflex action, are purely the product of molecular movements, and therefore, that there is no essential difference between them: what difference there is, being merely in degree of complexity. There is subjectivity of a sort in the stone as well as in the man; but we cannot experience the latter's any more than it can ours. Our simplest rhythms are probably more complex than the most differentiated analogous manifestations in the stone. In fact, we may infer that all rhythms possible to the stone are synthesized in our most rudimentary molecular movements. The process of differentiation of rhythm has progressed proportionately to the differentiation of the units of mass-systems, because each unit-system retains its own rhythms in the integration of which it becomes part. We may here state that, in this work, our business is to consider principles in connection with our own hypothesis; not to



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discuss the special evidences on which those principles are based. Those who require scientific *data*, *pro* and *con*, with respect to any premises assumed, but not proved, in this work, are referred to treatises dealing with the subjects. An epitome of the evidence in relation to subjectivity will be found in our earlier work.

We must assume that, under this process of progressive differentiation of mass-motions (of course, we are here dealing solely with internal motions), a stage would arrive when the mass-system would have developed so high a state of unstable equilibrium as to extend its normal rhythms in response to the free ether. We have already referred to Prevost's theory which assumes a "give and take" principle of radiation between all forms of matter, and a conveyance through the ether of such radiations. Science accepts this theory, so we will try to accommodate our hypothesis to it, and shew where they differ radically. On our hypothesis, we have systems of imprisoned units which preserve their initial rhythms, and we have an ether composed of free units endowed with similar rhythms.

In our illustration of sound and light phenomena, we had strings tuned to a certain note, and absorbing corresponding rhythms conveyed through air; and vapour system-units absorbing rhythms from other system-units, conveyed through ether. According to physics, ethereal transmission implies that the ether is merely a passive medium, and that the matter is the active agent; while our hypothesis, on the contrary, assumes the ether as the active agent outside matter, and also as the agent by which matter issued. In fact, the main difference between matter and ether is, in our hypothesis, that the units of the latter are so closely associated that the issue is a system from which the unit cannot escape, while, in the ether, the units preserve their original liberty. Now, having proof that a string responds to its "fundamental note," and, a string being a system of unit-systems, we may reasonably infer that every unit of a system similarly responds to its "fundamental note." What was the effect of the bugle-blowing on the string? It set certain molecules of air vibrating to a fixed extent, beyond their normal rhythms.

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These air-units started the same conditions in other air-units, which, again, transferred the state to the string-units. But now we have another factor to consider. The bugle did not blow itself, and the sound depended on the blowing. What started that? It was started by certain ether-unit-systems causing vibrations in other unit-systems composing the nervous organization of the blower, which vibrations were transferred through an incalculable number of systems in the cerebral and muscular organization of the player and the molecular organization of the brass. Thus we see that the originator of the "sound" is really the ether. Again, what is sound if there is nobody to hear it? For this perceptivity to occur, a similar cycle of phenomena must be manifested. To perceive sound, the hearer's unit-systems must respond to ether-units; otherwise the normal rhythms of his brain would involve what we call insensibility. Many instances may be adduced from medical records of people in whom unit-systems which should be in proximity to the outside ether are deficient. There are even instances in which such systems are so

deficient that the patient might be at once rendered practically inert matter, by closing his eye and ear. Then he became no more sensitive than a log. Thus we see that all our experiences must originate in the ether. And this must be the ether of free units.

It is evident that the matter-ether, according to our hypothesis, is not a passive medium, as it were, breathed in and out, and endowed with their own activities by matter-systems, as is ordinarily assumed. The ether necessary to our hypothesis never enters systems, though it must impinge on them. The systems, themselves, so long as they cohere, retain all the rhythmic energy with which they started. Hence each of their units must be similarly conditioned. What happens then, when the systems are dissolved? Then, of course, as systems, they are dead, and the life which departs from a system, is the dissolution of their bond by the units of that system. The rhythmic energy of such a system returns, with its units, to the ether; or, if it is only disintegrated into sub-systems, these form fresh combinations.

Assuming that the impingement of ether-atoms

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on mass-matter systems is the cause of increasing the energy of those systems—that each unit of such a system normally synchronizing with a free impinging unit absorbs some of the energy of that unit—then, assuming further, that the rhythmic energy of the universe is a fixed quantity, there must be some means of returning the absorbed energy to the ether, or mass-matter would ultimately absorb all the available rhythms. Accordingly, we will accept Prevost's theory, under the conditions of our hypothesis, that the origin of the matter-energy is the immaterial energy, not the matter, and that the matter is evolved from the supermechanical energy, which, again, is an emanation from the First Cause.

### *Résumé of Chapter III.*

After two cosmic units have united, evolution must proceed by unions of systems, not of units with systems. Weismannism applied. Illustration of synchronism: response of strings to fundamental tone, and, of vapours to heat-vibration. The evidence of subjectivity in relation to objective phenomena. Nation-systems, man-

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systems, cell-systems. Influence of the community on the individual compared with that of the physiological organism on the individual cell. Innate function and acquisitions—how they differ. Extraneous influence. Environment. Men and nations moulded by environment. Nations are as much organisms as are men. The mind of energy defined and shown to regulate the average of men's, nations', the world's thought. Mr. Spencer's formula and the matter-ether. Artificial selection determining the "fit" for civilized communities and thus controlling social evolution, is the effective energy of the ether-mind. Matter and mind-environments contrasted. The one tends to eliminate what the other would preserve. Ultimate issue of the struggle so far as concerns human societies. Evolution of a coherent man-system under some such conditions as are represented in the Socialistic ideal. Tendency of evolution to eliminate the brute type. Subjectivity and self-appreciation. Hypocrisy. Knowledge and honesty. Embryonic development. Conflicts in the human ovum. Infant and chicken. Molecular movement and "desire." Analogy from the

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effect of sulphuric acid on phosphorus. Metaphysics and verbal symbolism. The individual does not respond twice in an identical manner to the same stimulus. Physiological states ever changing. Subjectivity in a stone. Simple and complex rhythms. The ether is not a passive, but an active agent exciting matter to rhythmic response. Illustration: string's response to fundamental note. Inference. How sound is propagated. Ether-units cause nervous vibration. Ether the originator of sound. Perception of sound. Ether excitation essential to cerebral action. Dissolution of matter-systems involves disintegration into sub-systems or into units. In former case, new combinations arise. In latter, the units revert to free state.

## CHAPTER IV.

### ENVIRONMENT.

LET us now revert to our bugler, and assume, as well we may, that a few years have elapsed since we last left him as "chubby." By a multitude of curious and often painful experiences, he was enabled to pass through the vicissitudes of infancy, boyhood and early youth. He is now a vigorous fellow with a good development of cheek (perhaps also metaphorically applicable—but we never saw a bugler whose cheeks would not hold a dumpling), so we will call him henceforth, Mr. Chubby. Now, why should he blow a bugle? Men do not usually blow bugles. We know that Mr. Chubby's ancestor, "pulp," did not blow a bugle. It would necessitate our writing several volumes to give the reader full and complete information why Mr. Chubby bugles. We should have to trace origins as far as the great god Pan, and from him to Adam, assuming that Adam was the earlier arrival, and



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that either of the hypothetical personages ever existed outside the noddles of humanity. (The god seems, to the writer, quite as probable an entity as the other.) What we have now to deal with, in connection with Mr. Chubby, and, by implication, with humanity in general, is environment. In the foregoing chapter, we divided this factor into two categories: one affecting the mass-matter, the other, the mass-mind. Now, we all know, or should know, that the individual's "mind" is merely one of his body-functions: a special form of response to excitation mainly affecting particular parts of his nervous system. Then, it may be advanced, what affects his body must necessarily affect his mind, and what affects his body is that which causes its unit-systems, or rather, its units, to extend their normal rhythms. This being caused by the impingement of free ether-units on his peripheral sense-organs, why divide their effects into two categories? We are here getting into rather deep water and must be able to swim as well as paddle, or we shall go under! We stated that this mind-environment affected the individual from the outside, but so, it may be advanced, does

all environment. Granted. We will now try to establish a difference. The environment which affects the mass-matter involves only the persistence of types, while the other determines the persistence of certain attributes of those types. In other words, it decides the tendencies of the most complex matter-systems of those types by deciding the ideational products which fashion communities, as distinct from individuals. Again, it compels certain types to evolve a sub-environment enabling particular portions of a community to decide its "fittest" members. The tendency of this "mind"-environment is to impel the individual to sacrifice himself for the community. The tendency of the matter-environment is directly the opposite: to impel the individual to sacrifice the community. The individuals in a human community who are only able to respond to the matter-environment represent the type which must succumb, if mind-environment prevails, as apparently it does, or is destined to. These points we will now proceed to establish by asking and answering a few pertinent questions.

It may be urged, how can certain members of

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a community decide the "fittest" in that community, when the "fittest" are decided by the character of their own organisms? These dominant members do this by imposing their own rhythms on the others: they are responsive to the "mind"-environment, as the others are to the matter-environment, and, if the latter is to prevail over societies, the units of those societies, whose mass-systems are so integrated as to synchronize with the "mind"-environment, must dominate the rest. Then, how is it we find social atavism, or the reversion of societies to more primitive modes of thought, to occur, as, for instance, in the case of our own society, which is rapidly tending to, if it has not, unwittingly to itself, reached, the philosophic standpoint of classic Greece? Against this, we may ask, how can we know that the anthropomorphic ideas of *really* religious England did not represent atavism? How can we know that the "mind"-environment has not destined all mankind to be Rationalists? It is idle to argue from our individual, or even from our national physiological states, what is, or is not, conformable with the tendency of the

“mind”-environment: in other words, what is, or is not, advance. All we can do is to obey our organisms and rest assured that we could not do otherwise “if we tried”! Every fanatic and enthusiast will fervently protest that he is the servant of such a “mind”-environment as we are propounding. So he undoubtedly is; but neither he nor any other mortal can tell how. Who can estimate *all* the consequences of blowing his nose? How can any man know the ultimate drift of his most trivial action? How can *he* pose as the *deus ex machinâ* of evolution? No rational, instructed and honest man does deliberately pose in that character. What he really does, be he fanatic or stoic, is to follow his desires: to submit to his physiological state. Then, if he thinks he can see Truth, he will strike hard for her! But it is not for him to know whether what he sees *is* Truth. Only the “mind”-environment knows the final average. We are matter-systems existing to synchronize, with ethereal rhythms. We are automata.

We have already stated that the assumption of a “mind”-environment involves also the



assumption of a struggle for life between two environments and the ultimate evolution of a new product which, we may rationally assume, will be a more definite, coherent heterogeneity, in other words, a higher type than any within our experience. These environments we may, for the moment, treat as two differentiations of the matter-ether, one part of which now controls mass-matter, the other, mass-mind, evolution. How can this effect be conceived to occur? If the character of a man's brain as much as of his osseous or muscular structure is determined before he is born, is not his capacity for thought determined as fully as his agility or muscular strength? Certainly, his *capacity* is so determined. But, that does not decide what he *will* think, how far he *will* jump, or what weight he *will* lift. His hereditary endowment decides what he *can* do, but, not what he *will* do. It also decides what he will tend to do, and, when it strongly urges a man in a certain direction, a proportionately strong opposing force will be necessary to prevent that man from following his innate bent. This opposing force it is, and only this force, which

will prevent the next generation of Englishmen from emulating the career of a Matabele, or rather, a much more primitive individual than he. Though the brain-type of the Englishman may possibly be the higher, that is, the more complex matter-system, the Matabele of to-day, as well as the Englishman, has far transcended his hereditary endowments: his innate tendencies, through the communal experiments of generations of ancestors, as well as the Englishman's, are under the "drill-sergeant," from the day he enters the world. Were this "drill-sergeant" absent on the arrival of the next generation of Englishmen, they would probably function as social animals analogous to the lowest type of Australian aborigines. But, it may be again asked, how are we to conceive this "mind"-environment as energizing differently from the mass-matter environment? How are we to conceive a differentiation of the free ether without launching into metaphysics? We reply, there is no need to conceive a differentiation of the ether, as we are now dealing only with its effects. These are all we have to differentiate. Mind- and matter-

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environments, as definitions, are merely symbolizations of an evident fact: the fact that two classes of influence now control the evolution of the most complex matter-systems. The material (evolved from the immaterial) cause of these environments, is the free ether and the integrations of that ether: the mass-matter systems themselves. Again, our questioner may remark: How can the free ether oppose itself in the way suggested? How can it simultaneously drive organism in opposite directions? We reply: by manifesting opposing effects, just as mass-matter, itself, manifests them. All the effects manifested by mass-matter systems, from the pebble to the man, are the effects of progressive evolutionary combinations of systems, always involving greater complexity of rhythms (the more complex a structure, the later will be its evolution period). The mass-matter system which, so far as we know, manifests the greatest rhythm-complexity is man (in his nervous sub-systems). Again, the most complex rhythms of these nervous sub-systems issue from those which represent the most coherent heterogeneity. Such parts, we

may reasonably assume, are the cerebral cortex, the thalami, and the corpora striata. A less complex part, we may assume to be the medulla and cord. Again, we know that the cortex is the latest evolved part of a nervous system. Only the higher types possess it. Further, we know that man possesses the most complex cortex. Scientific psychology tells us that this cortex is the centre whence proceed manifestations which *are not essential to the existence of the organism*. It is quite possible that other manifestations which *do* concern the existence of the organism also proceed from the cortex; but, this does not affect the fact that an idea, *per se*, does not concern the organism's existence. We have symbolized, by the word intellect, a purely imaginary source for this particular manifestation of the cortex. This word is a bequest of metaphysics, and, like many another similar bequest, has greatly helped to befog humanity. It is evident that an idea, *per se* (and an idea must be one of the most "real" things in existence), has no necessary connection with the visceral activities which preserve the organism as a "living" entity; in fact, common



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experience tells us that a vast number of human organisms, to say nothing of brutes, manage to flourish, entirely destitute of ideas! We call such people, men of good common sense. If they alone existed, there could be no social evolution. They are too "practical" to have ideas. We accordingly assume that the human organism might lead a very tolerable vegetative existence without the most complex parts of its nervous system. On the other hand, no organism can thrive without a visceral system. Physiologists tell us that this visceral system is kept in order by the less complex medulla. Now, what is not essential to a system, is really superfluous. And what is superfluous to a physiological structure must tend, however inappreciably, to destroy that structure. The gratification of the visceral "appetites" keeps such a structure "alive"; whereas, the gratification of the "intellect" does not tend to keep it alive. Consequently, it tends to destroy that structure. (Of course we employ the term gratification in a physiological sense as implying opportunity to function.) Thus we see how matter may oppose itself. Let us now see how

ether may similarly energize. We have shown how a mass-matter organism may oppose itself without becoming two organisms. We will now show the same in respect to the ether-organism.

Exercise of function augments the efficiency of faculty, whether "good" or "bad," *in the individual*. Thus, what a man does, besides deciding his social status, decides what innate capacities he shall most frequently use. As already stated, what he *can* do is decided by heredity: nothing can alter the *limits* of his capacity. We may as well ask an intrinsically "bad" man to be a "good" one, as ask him to be a kangaroo! In fact, we do not know whether there exists a bad or good man, because we do not know whether bad or good exists. All we do know is that what we imagine are bad and good exist. If this seems to the reader an untenable proposition, he is again referred to the writer's earlier volume and what follows in this. On the other hand, what a man *will* do is decided, very often, more by environment than by heredity. We will explain how this occurs.

That which preserves the visceral and sense organs in their highest efficiency involves "selec-

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tion" by the mass-matter environment. That which preserves the more complex parts of the brain in their highest efficiency involves "selection" by the mass-mind environment. The only evidence we have of the efficiency of an organ is the manner it functions. If the viscera function well, the man will be physically vigorous. But, the same effect does not necessarily, or even commonly, ensue, if the higher cerebral organ functions efficiently. Brain-function, *per se*, has a tendency to destroy visceral function. Notwithstanding a few apparent exceptions proving the contrary, the preponderance of evidence is altogether in the direction we state. In all the cases apparently proving the opposite, we have no means of showing the particular individual's state under altered cerebral conditions; while we have direct evidence that great cerebral energy involves visceral deterioration. In other words, it tends to kill the organism. Here the mass-matter environment, as we maintain, tends to preserve what the mass-mind environment tends to destroy. Both forms of "selection" issuing from these environments are, of course, strictly

“natural,” but we here employ the term “natural” to signify only that selection which preserves visceral efficiency.

This “selection” must not be confounded with the ordinary application of the term. There is here no *active* process of choosing exerted by an agent external to the organism. The “unfit” organism itself causes the “selection” by dying and thus leaving the field to the “fit.” This implies that the struggle for existence, under natural conditions, is so keen that only those organisms which are, viscerally, the best adapted to their surroundings can find sustenance enabling them to propagate their kind. Thus, their progeny come to represent the type. The facts now before us with regard to evolution conclusively prove that the most apparently trivial differences in individual conformation may decide for normal life or premature death in the individual. We are, in the above statements, referring to types which live under what we call natural conditions. The human type, in all civilized and in most savage communities, is not one of them. So soon as a type begins to coddle and doctor its units, there

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is a departure from the conditions involving what naturalists call the struggle for life and survival of the (viscerally) fittest. The issue of our attempts to preserve our "unfit" units involves what is called panmixia (a general mixing of types), involving a tendency to retrograde from the level attained under natural selection. These propositions lead us to another point. This is: natural selection is the *only* influence which has changed types from their primordial states, and, so soon as natural selection ceases to operate, the type must (viscerally) inevitably begin to revert to its primitive state. This will be evident when we remember that every organ, member, or part of either, which is altered by "selection" involves a departure from the first typical character (which, of course, was derived from an anterior type and so, backwards, to the first type, or types which issued from primordial ethereal integrations) and, that those physiological characters are the most firmly fixed which are the most ancient. We see from this, that without natural selection all organic life must tend towards the state of primordial ether-integrations; in other words, must tend to the

death of the mass-matter system. Now we come to a very important consideration. If, as before stated, we cause a departure from the conditions of natural selection by our solicitude for the individual, and, if natural selection is essential to typical (visceral) efficiency, are we not injuring the human type by our efforts to preserve the individual? This is not an easy matter to decide about. First, we *do* show solicitude. Then, that solicitude must be within the scheme of evolution. (Depend on this: we can do nothing outside that scheme.) Probably, it is disadvantageous (immediately, but not ultimately) to humanity that some people should be allowed to have children and that some children should be preserved by a hothouse system of nurture. Personally (from what he sees occurring in individuals), the author inclines to the belief that some restriction should be imposed. However, there are many considerations in favour of letting human nature "have its fling." We have no means of foretelling what *hereditary* manifestations in the offspring will ensue from the sexual union of any two individuals. Especially this applies to

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the cerebral faculties. The reason is: any two eggs, or spermatozoons, whether the parents be "fit" or "unfit," always contain different hereditary combinations. An "unfit" parent may have, among her or his ova or spermatozoa, both "fit" and "unfit" combinations. This must be the case, unless his or her ancestors for many generations, were all of the same class, which is quite outside probability—we may even say possibility. . . . At any rate, the combinations at each sexual union must involve an incalculable number of probabilities. Again, could we calculate probabilities with regard to the sense and visceral organs, we should still be far from having any safe basis of deduction with regard to the far more unstable elements concerned in the highest brain function. We know that twins issuing from the same egg rarely manifest identical physiological states, putting aside the consideration of external resemblance which can only involve apparent identity. Then, if parents are individually ill-balanced, mentally and physically, would seem, according to the latest research, by no means to preclude the possibility of "fit" offspring. Again,

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if we limit consideration to the higher cerebral faculties we shall find that though the paternal and maternal plasms be individually "bad," from the hereditary point of view, the mere fact of their *combination* in the offspring may involve radical remodifications in the highly unstable nerve-elements. Such effects might cause an absolute reversal of the mental conditions originally existing. Thus a "fit" mental type might issue from "unfit" types. Common experience, in fact, points to this conclusion. Until we have more knowledge, or rather, some knowledge, as to how the paternal and maternal plasms react on one another in the offspring, it is, accordingly, premature to dogmatize regarding the advisability of restrictive measures, unless—I venture to assert—in strongly marked cases of nervous degeneration of both sexes. Then, I think, it would be prudent to forbid sexual connection, or at any rate prevent procreation.

Now we will revert to our main proposition, that the ether-organism, like the mass-matter organism, opposes itself by favouring two opposed processes of development. The basis of our



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logical structure is an ether composed of atoms endowed with special rhythms of motion, the equivalents of antecedent potentialities in a super-mechanical, immaterial source of energy. We further propounded that the greater the coherent heterogeneity of an evolutionary product, the more ethereal rhythms it would respond to. We offered two analogous illustrations from phenomenal manifestations in respect to sound and light, to show that mass-matter does, to common apprehension, respond to external rhythms in conformity with our hypothesis. We further offered concrete illustrations (the ivory balls) to show in what manner these rhythms are propagated through the mass-matter atoms. It is demonstration to our reason that the human brain typifies the greatest coherent heterogeneity manifested in any mass-matter system. Hence, the human brain must, on our hypothesis, respond to more ethereal rhythms than does any other product of mass-matter evolution. As a corollary of the above, we affirm that those cerebral manifestations involving the exercise of the brain's most complex parts, are the manifestations which have latest

appeared in evolution. These are what we call intellectual manifestations. Then, according to our former reasoning, we have established that the tendency of intellectual is opposed to that of visceral manifestation, the former tending to exterminate what the latter preserves. Yet both are the product of environment, and this issues from the ether-organism. Consequently, like the mass-matter organism, the ether-organism opposes itself.

Having thus, we think, established our proposition that the mind-environment and the matter-environment are two opposing evolutionary manifestations affecting mass-matter systems, we have now to revert to another of our propositions: that the mentally "fittest" of a community impose on the rest their own rhythms issuing from the mind-environment. This involves that those units who respond to the rhythms representing any particular mental tendency destined to prevail, *are* the "fittest." On the other hand, we can never foresee which rhythms are destined to prevail. We can only guess. Every honest propagandist, of course, guesses that his own

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rhythms are destined to prevail, otherwise he could not be an enthusiast. No social evolution ever proceeded from Agnosticism. The issue is, that the doctrine of survival of the fittest and the struggle for life applies to propagandas as fully as to organisms: that every propaganda has to exterminate its rivals, before it demonstrates that it is the fittest to survive. We also see that, if the mind-environment is destined to ultimately predominate throughout evolution, matter must be exterminated. The latest conclusions of physicists tell us that ascertained facts point to the ultimate extinction of the universe as we perceive it. What will constitute the next universe? On our hypothesis it will be a universe of mind. Can we conceive such a universe? No. But, that does not destroy reasonable inference from what we can conceive. Gilbert of Colchester could not conceive a phonograph; nevertheless, we can touch one! The more experience we acquire, the more fully we must recognize that nothing is impossible to evolution. We stated above that every propaganda, to demonstrate that it is the "fittest," must exterminate its rivals. If

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this were not the case, men would act on a "*laissez faire*" principle involving social stagnation. Corollarily, those brains which initiate a victorious propaganda must be considered among the "fittest" of their period. Contemporary men do not readily recognize their fitness because, when such initiators first energize, the rhythms which they try to impose on their fellows are beyond the evolutionary stage reached by the latter: the initiators are sporadic germs destined to ferment the type. This applies throughout art, science and philosophy. Indeed, this is so manifest to common experience as hardly to need emphasizing as a fact. Nevertheless, it is necessary here to state it because it is necessary to mark its intimate connection with our hypothesis. We see, from the application, how society is the puppet of a destiny over which it has no control. We see how the mind-environment fashions in defiance of all human determination; and, we see how the fittest portion of a community comes to dominate the rest: how its rhythms ultimately become those to which humanity will "dance." The change of response on the part of society is

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generally a gradual process. Sometimes, however, a propagandist arrives who allows society no time for deliberation. Then, society shows what poor stuff it considers itself—and, thereby, obeys the mind-environment's command to gallop. Usually evolution permits society, imperceptibly to itself, to glide into the new order, as a straw is carried by the sluggish current to the whirlpool. Society, no more than the straw, knows whither it is going. It even sees the swirling eddies above its head, before it realizes that it is over the cataract. Then, all is well. Society finds that, as an organism, it still lives. Soon, its life-thrill is more buoyant than ever, or society fancies it is. Thus society comes to see salvation in the cataract—until it again begins to glide to another “whither.” So, social evolution proceeds. So, the mind-environment manipulates its clay, and we see how the “fittest” in a community come to impose their rhythms on the rest.

We stated that inferences from facts lead to the assumption of an ultimate extinction of matter. How matter could be exterminated is difficult to imagine, and, of course, impossible to formulate

in any scientific hypothesis. All the writer can say on this point is that no current scientific hypothesis will enable us to formulate a method by which matter could come into existence. Nevertheless, here it is. Again, the facts we have ascertained regarding it, drive us irresistibly to the inference that matter has originated from immateriality. Then, we may derive from facts a parallel inference that matter will ultimately revert to immateriality. The facts that enable us to arrive at this conclusion are those stated above proving the existence of a mind-environment ; that this product has issued later than the matter-environment ; that the former now dominates the latter ; that the issue of the domination will involve the ultimate annihilation of the product of the matter-environment. The final struggle for life, so far as regards the universe will thus be, or rather is now, between the mind-environment and the matter-environment, and the latter must succumb. In this conclusion lie the germs of a future world-religion which will annihilate all rivals. The struggle for life among creeds will end long before that between the two environments.

*Résumé of Chapter IV.*

Mind- and Matter-environments—Argument for the two categories. Matter-environment decides the persistence of types. Mind-environment decides what attributes of types shall prevail; compels certain types to evolve sub-environment; impels the individual to sacrifice himself for the community. Matter-environment impels him to sacrifice the community. If the mind-environment prevails, the individual responding wholly to the matter-environment must succumb. What is the tendency of the mind-environment can only be known of the past, not of the present. Every enthusiast thinks he represents such tendency. Struggle between the two environments involves evolution of higher human type. Spencer's formula. Hereditary endowment decides what a man can do, not what he will do. Effect of mind-environment. Instances: Englishman, Matabele. How the free ether opposes itself. How mass-matter opposes itself. Conflicting effects. Visceral and ideational manifestations. The human organism might lead, divorced from its most com-

plex nervous parts, a tolerable vegetative existence. Gratification of the intellect tends to dissolution of organism. Visceral gratification tends to preserve it. Good and evil. Selection by the matter-environment preserves visceral efficiency. Selection by mind-environment preserves highest cerebral efficiency. Brain-function, *per se*, tends to visceral deterioration. "Unfit" organisms cause selection by dying and thus leaving the field to the "fit." This implies in respect to selection by the matter-environment, that the struggle for existence, under natural conditions, is so keen, that only those organisms best adapted to their surroundings can find sustenance enabling them to propagate their kind. The most apparently trivial individual difference may decide between survival and extinction. The human type, under civilized conditions, not governed by natural selection of the viscerally fittest. It is premature to attempt to decide to what, if any, extent society should interfere with individual selection in regard to procreation. Sexual union of two unfit organisms may result in mentally fit offspring. The instability of nervous elements may cause such



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effect. Cerebral manifestations involving exercise of brain's most complex parts are the latest evolutionary products. The mind-environment controls such manifestations and, in doing so, opposes visceral efficiency. The mentally fittest impose their rhythms on the rest. We can never foresee who are the mentally fittest. The mind-environment decides this for a later generation. No social evolution ever proceeded from agnosticism. Doctrine of the survival of the fittest and struggle for life applies to propagandas as fully as to organisms. The universe, as we perceive it, will be annihilated. The next universe. The mentally fittest transcend the average evolutionary stage, hence, are not recognized by their contemporaries. How society drifts. The extinction of matter, reasonable inference. Final struggle for life between the mind- and matter-environments. Final struggle between creeds.

## CHAPTER V.

### MIND-ENVIRONMENT AND METABOLISM.

WE must now revert to Mr. Chubby and consider another aspect of the question, why he bugles. This question has already led us a long way from Mr. Chubby. We will make another departure from his personality. Mr. Chubby bugles because he had a desire to learn how to bugle and gratified his desire. We have already devoted some attention to the word desire and we came to the conclusion that it was intended to symbolize a physiological state. Now, what is that? Physiologists tell us that it is the condition under which an organism, or part of it, responds, by function, to excitation. Again, what is function? According to our hypothesis, it symbolizes the issue with regard to the organ or its part, of its reaction under the rhythmic stimuli to which it is responsive. These stimuli are always, ultimately, the rhythms of free ether particles, although, before these

reach many organs and their parts, such rhythms have excited other intermediary organs and parts. According to its systemic complexity, any organ or part will be able to radiate, as function, a greater or lesser number of excitant rhythms. The interactions of the functions of all the organs and parts of an organism, constitute what we call the life of that organism. Physiologists tell us that the function of any organ or part is ultimately governed by function of the nervous elements. In the higher organisms, the nervous system centres in the brain which, itself, is preserved as a functioning organ, by the activities of the visceral parts of the organism which it controls. Thus, a reciprocity of action occurs between the governor and the governed. Moreover, the brain, of course, in conjunction with the cord, can only manifest its highest efficiency through the co-operation of various organs and their appendages. The former are called sense-organs; the latter nerve-cells and fibres. The latter ramify over the periphery of the organism, and, analogously to telegraph wires, convey external rhythms to the brain. Some of these rhythms are, through

the metabolic action of the most complex parts of the brain, returned directly from the brain to the ether. The issue is then, what we call an intellectual product. Other rhythms, instead of being thus directly returned are transmitted to less complex parts, such as the medulla and cord, thus permeating the visceral and muscular systems and, ultimately, again reaching the ether in the shape of muscular energy and various sensuous manifestations. The ultimate source (within the organism) of all organic manifestations—intellectual, muscular and sensuous, are the motions of particles, molecules, of the nervous system. An illustration of the principle of such movements was offered in the reciprocal behaviour of two ivory balls.

Now, we have to apply our own hypothesis to the facts of cerebral response issuing in the physiological product we call thought. We accept Prevost's theory of exchanges as equally applicable to organic and inorganic structures. There is no difference in essence, between their responses. The only difference is in the extent of rhythm involved in the response : in the number

of ethereal vibrations which the structure is capable of assimilating for its own functions. The brain's thinking is just as much an illustration of the circulation of vibratory excitation between the ether and the brain as is the radiation between two bodies at different temperatures, of such circulation between those bodies. The temperatures, as much as the thought, represent specific motions of ether atoms transmitted by the particles of the organic and inorganic structures. Just as one piece of iron receives radiation from another in the shape of heat, so one brain receives radiation from another in the shape of thought. We can measure the former radiation with a thermopile and a galvanometer. We have no similar means of measuring the latter. On the other hand, we can measure the heat radiation which is always a concomitant of thought radiation. Of course, the brain when quiescent with regard to ethereal excitation (as in the deepest sleep, although some authorities doubt whether, even then, the brain does not respond to external stimuli) evolves heat as a concomitant of mere visceral interactions. The

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heat we refer to above as the concomitant of thought, is that issuing directly from molecular impacts caused by the ethereal stimulus. This heat, like that issuing from normal rhythm, represents a purely mechanical product of the impacts. The thought itself represents the metabolic product of the impacts. As already stated, it is futile to attempt to apply to this metabolic product, whether in regard to digestion or thought, any process analogous to that applied to verifying the heat. All we can do is to acknowledge its existence as an equally evident issue of the movements. In fact, in this respect, we are in no different position with regard to the response of a polype than of a man. We can clearly trace the evolution of the man's from the polype's response, and, we can rationally accept no other source for both responses than that we now suggest.

We accordingly infer that the heat and the thought represent two grades of ethereal rhythm absorbed by, and originally excitative of, the brain. It may be asked, how can the brain discriminate between grades of rhythm mixed together in the ether? The reply is that the

brain responds to *all* forms of rhythm which can affect the organism, but, that no other part can thus respond. All other parts are compelled to select according to their complexity from the total response of the higher nervous strata. Thus, only the lowest rhythms reach the lowest organic substrata, while the highest brain (say, the cortex) being unable to transmit to adjacent systems in the organism, its own full absorption is compelled to, as it were, reflect this back to the ether. The result of this process of reflection, so far as concerns the organism, is thought-product, or idea. At the same time there is a transmission to the next lower-grade matter-system, of the rhythms within its functional capacity. Thus, in series of transmissions to lower and lower grades, the original excitation ultimately permeates the organism. Each process of transmission is accompanied by the various local and systemic manifestations which we recognize in the symbolization: physiological state. This, in the highest brain, results in ideational effects; in other grades, as muscular activity; in others as visceral activity; in others as sense-perceptivity. The sum-total

of the absorbed rhythms is the total of organic function. Accompanying each of these processes is the manifestation we call heat. The grosser the transmitting medium, the more heat is evolved by the impacts of its particles and the greater is the mechanical effect.

Now, it will be evident that, if ethereal rhythms thus decide the organic rhythms, that the chances against identical cerebral response in any two organisms, must be infinite. The higher the complexity of an organism, the more inconceivable must be synchronism between the rhythmic responses of any two individuals of the type. This leads to the inference, with regard to the human type, if to no other, that did no principle overrule individual rhythmic idiosyncrasy, no collective intellectual movement would be possible to the type: it would remain an indefinite, incoherent homogeneity: a chaotic whole. With the lower complexity of response possible to the inferior types, the necessity for such a principle may appear less; nevertheless, the principle must operate. What we call instinct, is, with regard to such types, the primitive manifestation of the



mind-environment. In these types the manifestation of this environment involves great apparent restrictions with regard to individual activities; but, could we apprehend all the restraining factors, we should find humanity as rigidly curbed as the brutes; in fact, we might then apply mathematics to the manifestations of humanity as confidently as we now apply it to a chemical combination. Then, we could estimate the mind-environment as accurately as the matter-environment. We may see how the theory of correspondence between rhythmical complexity and freedom of activity is confirmed, if we reflect on the actions of those organisms we think we know best: our fellow-men. We see, in regard to them, how enlarged rhythmic scope issuing from a "fit" cerebral machine and its wide assimilation of the responses of other brains tends to the catholicity of the individual; how bigotry and egotism then tend to disappear; how alertly the individual responds to the multifarious movements of his time. We understand from the hypothesis, why scientific specialists rarely become active intellectual leaders of men and rarely perceive that theirs is not the most

important work within the capacity of humanity. They are, through their environment, physically incapacitated from realizing that all research is really one. Their rhythmical responses, through inevitable and permanent application to *minutiæ*, become warped; hence, on issues outside their immediate concerns, they fail to impress their fellow-men. The mind-environment utilizes them collectively, rather than individually. To them, collectively, society is primarily indebted for all its recently acquired freedom of action. To them, men owe the downfall of superstition and the enthronement of reason. The vast acquirement of experience by civilized communities renders inevitable that some units shall sacrifice their potentialities for the advantage of the rest. Through these units, the evolutionary factors which enslave humanity are becoming more and more incalculable. Through these units, society knows that its destiny is inexorably determined. Through these units, will be achieved the next great feat of evolution. The only thinkers destined to drive humanity, are those who weave their thoughts from the experiences won by

scientific specialists. It would not be rash speculation to assert that the greatest revolution known to history will occur within the next twenty years, and it will differ from all precedent revolutions, inasmuch as it will emanate from objective verification and remodel fundamentals. Human passions will, as in every previous revolution, be the apparent factors. The real source of ferment will be the experiences gained for humanity by scientific specialists. However subversive may appear the verifications upon which men will act, there will be no break in evolutionary development. That will proceed with majestic sweep to inconceivable consummation. Though social motors will be changed, there is only one End. Those who fight against the experiences won by specialists contend to alter the End. Specialists are going to render men honest. When man becomes no conundrum to his fellow, "false face" will be less available than at present to "hide what the false heart doth know." We shall be tolerant of the "blackness" of humanity in all, except one respect. We shall always have a hearty kick ready for the hypocrite. His will be the one



unpardonable "sin." Newman, in his "Grammar of Assent," gave men a masterly example of a conscientious method of manufacturing knaves. Scientific specialists have given us a vastly more effective means of manufacturing honest men. Men will soon regard the keen logical insight of the Newmans as they regard the keen commercial insight of the mock auctioneer, or the keen political insight of the parliamentary "old hand": as something admirable in its way, and demanding the closest scrutiny!

We stated above that, as in the case of pieces of iron at different temperatures, of which the hotter piece radiates to the cooler, so, one brain radiates thought to another. How can this occur? may be asked. Thought is not heat. We answer, thought is not heat, but, it is merely another form of rhythmic response by mass-matter systems, the particles of which synchronize with the ether particles. We have already discussed the plausible subjective objections which may be raised, so we will proceed, on our hypothesis.

All particles of mass-matter systems are continually exchanging with one another excitations

originating as ethereal rhythms. These excitations are thus extraneous to the proper motions of the imprisoned particles which are caused to transiently exceed those proper motions. The extraneous rhythms to which a mass-matter system, through its particles, is responsive, represent, with regard to each particle, what its fundamental note does to a stretched string. We had an instance of response to a fundamental note, in the strings which responded to Mr. Chubby's efforts. Now, some fundamental notes are too high or too low to be apprehended by human "ears," just as certain other "fundamental notes" which traverse ether in the shape of the so-called obscure radiations, are too "high" or too "low," that is, too short or too long, to be apprehended by human "eyes." The writer's hypothesis is that though such radiations are unseen by the "eye" and unheard by the "ear," they are "heard" and "seen," under certain conditions, by the brain, and that the effect of the brain's response to such vibrations is merely different from the effect of its response to the seen and heard radiations to the extent that

ideation, instead of vision and hearing, is the issue. The conditions under which a brain is responsive to the unseen and unheard rhythms, are: that its own complexity is high; that is, that it is, hereditarily, an efficient evolutionary product, and, that its innate potentiality has been exercised through the impingement on its peripheral appendages, of such rhythms. The environment which causes such impingement is the mind-environment. This has compelled the owner of such a brain to assimilate the experiences of his time. Now, this preliminary process of assimilation is only a preparation for his own response to the unseen and unheard rhythms. The rhythms he, at present, assimilates, were unseen and unheard by the eyes and the ears, but were apprehended by the brain, of him who first formulated the experience; but, they are either seen by the eyes, or heard by the ears of him who receives them through a book or a lecture. Only when he has thus heard or seen does the recipient of the experiences begin to apprehend unseen and unheard rhythms on his own account. These he will translate, and thus some other brains will

become recipient and begin to apprehend the unseen and unheard.

We have assumed sound as well as light to issue through ethereal excitation. It may be asked, How can this be the case when sound cannot be conveyed through a vacuum? We reply: Because sound is not heard through a vacuum is no proof that the ether-particles are not the origin of sound as much as of light. We cannot see sound-waves, nor, can we hear light-waves. Why? Because evolution did not fashion the eye to respond to the former, or the ear, to the latter. Then, because we cannot hear sound through a "vacuum" is merely proof that our ear is only adapted to react under the influence of air-particles, not that the sound does not exist as ethereal vibration. Our hypothesis is that sound, like every other form of particle motion, except the proper motions of particles imprisoned in systems, is derived from and through free ether atoms, and that, in the case of sound, the ether motions are simply transmitted, by an intermediate matter-system, to the air-particles and by them, to the ear. That our brain perceives them as

sound is merely an instance of its metabolic action, just as is the action of the visceral juices, on food. Then, the rhythms of the matter-systems consumed as food are transferred to atoms of the visceral juices and ultimately permeate the organism as nerve-nutrient. In this process, assimilation and metabolism of the consumed matter-systems as well as of their rhythms takes place.

It may still be urged: After the sound-waves have passed through the "vacuum" they re-enter the air. Why do not the ether-particles again transfer the motion to the air-particles, thus enabling us to again hear them? This leads us back to one of our main propositions. We stated that the brain responded to the *total* of ethereal vibration, but that certain substrata could only select special rhythms. These they did not derive directly from the ether which acts, as a direct excitant, only through the peripheral nervous ramifications of the organism. This means that molecular substrata are only enabled to exceed their normal rhythms through the energy of these ramifications. This applies to the air-molecules which convey the sound. They also must receive



the stimulus which is to excite them beyond their normal rhythms, only indirectly through the ether; directly, through another matter-system, say the sun, or through a matter-system in immediate connection with, and able to metabolize ethereal vibration. Such a matter-system was, in our first illustration, Mr. Chubby. He responded and metabolized when he bugled. The air-particles responded to his bugling. Our auditory apparatus responded to the air-particles. Then a cycle of actions commenced in our organism, culminating in a retransfer to the ether. The air-particles, like other non-nervous molecules, never have their proper motions directly disturbed by the ether, though they are, like other matter systems, continually radiating and renewing through the ether, those proper motions. To enable the ether to exercise direct agitation, beyond their proper motions, on the particles of matter-systems, such systems must be sufficiently complex to respond by metabolic assimilation, to the total proper motions embraced within the ether. This is only possible to the

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most complex matter-systems. Such are the nervous elements of a "living" organism. How such matter-systems, individually, will respond by metabolism to the excitation, is determined by their comparative complexities. For instance, the human brain responds by different metabolism to that of a lobster's ganglia. The metabolic evolution of the latter is less advanced because their matter-system differentiation is inferior. They have to select from the totality of the exciting elements, just as have the substrata of the human organism. Only, in the latter case, the selective process proceeds from other and higher parts of the organism, while the lobster's ganglia select directly from the water. Proceeding from the organic to the inorganic, we come to matter-systems which have no metabolic power. They respond to the ether by merely receiving and radiating the least complex rhythms, corresponding to their own primitive systems. Their selection involves merely the continuance of their own proper motions. Reverting to sound *in vacuo* the waves which affected the air-molecules were transferred

back to the ether in the "vacuum." Thus, on our hypothesis, it will be seen that no remanifestation of sound could occur.

It was stated above that the only effect of the impingement of ether-particles on inorganic matter-systems was to preserve the normal motions of the latter. It may be asked: How are we to reconcile this with, say, the altered motions of gas-molecules through heat? Is not radiant heat ethereal motion? Here we have the same factor to deal with as in regard to sound. In the case of heat, we have a transfer through ether, from one mass-matter system to another, of abnormal motions. But so, it may be advanced, we had in the case of the sound which was lost *in vacuo*. We reply: The energy of the heat-motion is infinitely greater than that of the sound-motion. Consequently, the penetrative power of the former is correspondingly greater; or, conversely, the resistance of the ether is intensified so as to transfer the motions, instead of absorb them. This difference has the effect of practically placing the gas-particles and the source of heat in juxtaposition. They

become practically one matter-system. On the other hand, in the case of sound, the motion is so feeble as to be absorbed and dissipated among its own atoms by the ether before it can reach the air-molecules beyond the "vacuum." How could the ether thus absorb and dissipate? By appropriating, as the strings appropriated the vibrations caused by Mr. Chubby's bugling. And why did it not appropriate these from the air? So it did ultimately, but not before they reached the strings and our ears. After it had done this, nothing remained in the string or air-molecules but their normal rhythms. The ether got back what it lent.

We have made free use of the term metabolism. What does it symbolize? According to our hypothesis, it symbolizes the process by which an organism is able to transmute stimuli into products apparently essentially different from the stimuli. The stomach manifests this process in assimilating food for the renewal of the somatic cells of the organism. The muscles manifest it in changing the nervous stimuli they receive into a multitude of mechanical effects. The

nervous system manifests it in transmuting ethereal rhythms into sense-perceptivity, intellectual products, muscular manifestations, visceral function. Protoplasm is the organic basis, and ethereal vibration the ultimate source of every such process of metabolism. As already stated, it is at present impossible to formulate a satisfactory scientific hypothesis covering these phenomena. I will now try to establish my own hypothesis with regard to them. Future experience, I hope, will confirm my inferences. Physics attributes to organic and inorganic matter-systems the potentiality for various manifestations which it calls radiation, absorption, reflection, emission. Such terms imply, according to our hypothesis, that matter-systems manifest selective synchronism with regard to ether rhythms; that, to adopt an analogy from sonorous phenomena, according to the "fundamental note" of its component atoms, any mass-matter system will accept or reject external ethereal rhythms. We know that, in every case of vibration involving musical sound, there occur, simultaneously with the principal rhythm, a

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number of subsidiary vibrations, called harmonics or overtones. I would compare the universe to a musical instrument, and the mind environment, to one of its tones. We may assume that the human brain responds to this tone collectively. Individually, the brain perceives but an infinitesimal number of its overtones. Now, in all sound-vibration involving a fundamental note, it is found that the overtones involve divisions of the vibrating medium, in a numerical sequence of its parts. Such a sequence is always perfect; of even, or of odd numbers. Thus, a stretched wire vibrating longitudinally, vibrates as a whole, and segmentally, nodal points marking its divisions. Dividing such a wire according to the segments, we find their sequence to be 1, 2, 3, and so on. That is, the first vibration represents the whole wire; the second, the half; the third, the third; the fourth, the fourth parts of the wire—these vibrations, after number one, being overtones, and all, of course, proceeding simultaneously in the wire. Similarly dividing a rod, fixed at one end and vibrating longitudinally, we find the order of vibrations to be 1, 3, 5, 7.

and so on—always odd numbers. The order of a rod free at both ends and vibrating longitudinally, is the natural sequence 1, 2, 3, 4, 5, &c. A closed tube, say a stopped organ-pipe, has this order: 1, 3, 5, 7, &c. An open organ-pipe gives 1, 2, 3, 4, &c. A rod or string fixed at both ends and vibrating transversely gives 1, 2, 3, 4, 5, &c. We might extend this list by instances from all musical vibrating mediums. Now, this seems to open up a very wide and deep issue, and to be likely to assist us in our present investigation. It is clear evidence, to me, that outside our subjective selves, there is an objective and close bond between our ideas and the sequence of ethereal rhythms. If our ideas of number are not the effect of synchronism between our brains and ethereal rhythms, how can we account for these sequential concrete manifestations? Why should visible and audible phenomena proceed in such numerical order if the same sequential rhythmic stimuli which cause the sonorous mediums to vibrate in their orders did not also cause men's brains to conceive the numbers representing those orders? It may be asked:

How can we mentally connect such inconceivably minute motions as those involved in molecular vibration, with the perception of a sound-wave of several feet? We will try to render this apparent. It is found that the wave-lengths of a man's voice in ordinary conversation vary between eight and twelve feet; of a woman's, between two and four feet. The pitch is, of course, determined by the wave-length. The ordinary pitch of a woman's voice, in its lower register, is thus found to be more than an octave above a man's; in its higher register it is two octaves. Each sound-wave represents one movement of a series of air-particles involving a complete condensation and recovery of their normal states by such a series; each film of particles thus transferring the condensation and rarefaction to the next. In the case of the human voice, the initial air stimulus is derived from the vocal chords covering the top of the windpipe, as an elastic diaphragm with a slit in the middle. Air from the lungs going through the slit, sets the two membranous parts in vibration. The rate of these vibrations decides the degree of condensation and rarefaction



in the outside air, and, as explained, the length of the sound-wave and consequent pitch of the voice. Again, to enable it to perceive the air motion, the organism is provided with another member: the ear. This is also provided with a vibrative part, called the tympanic membrane. This bends once in and once out for each sound-wave it receives. Thus, we have a membrane vibrating a minute fraction of an inch, producing air agitation extending several feet; then producing, through this air, the compression and expansion of another membrane, which compression and expansion, again, produce molecular movements permeating a number of sensitive fibres. Here we have a scientifically verified sequence of cause and effect. We see that molecular motion does produce sound-waves. Nobody questions the sequence. But, when we state that the next issue, metabolism, the sense-perception called sound, is not, as fully as the others, part of this sequence, some people say, impossible! Now, supposing we were densely ignorant with regard to recent scientific applications of theory to practice, and were told that men would be able to hear the sound of

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Mr. Gladstone's voice after he was dead, issuing from a box, we should, if we were of the average mental calibre, also exclaim, impossible! Yet we might believe that a certain man flew up to "heaven" through the clouds. That morsel of information we should probably swallow as readily as a Colchester "native." Metabolism is too marvellous—the other is a matter "to swear by." Yet, we have overwhelming rational evidence that metabolism is a natural phenomenon, and that the flying business was never a supernatural or natural phenomenon. We are, nowadays, compelled to recognize that deductions inevitably issuing from sense-perceptions are more reliable than the perceptions themselves. The mind-environment scrutinizes the former; the individual subjectivity, the latter. With regard to the perception of sound, the mind-environment thus states the case against subjectivity: If the diaphragm of the windpipe vibrates; if its vibration causes the air to vibrate; if this causes the ear-drum to vibrate; if this causes nerve-molecules to vibrate; then, whatever consequences issue to our subjectivity, they are the effects of the molecular move-

ment. Again, if cerebral metabolism, in the case of sound, is thus proved to issue directly from molecular motions, then we have no logical reason to doubt that every kind of metabolism proceeds from the same cause; that the word metabolism can logically symbolize only a phenomenal manifestation of motion; that so soon as a mass-matter system involves sufficient complexity of rhythmic interactions among its units, so soon will metabolism be the issue and that system evolve a subjectivity. We will now make further application of scientific verifications to the question, How nervous molecular rhythms are allied with sound-rhythms? If we attach a sharpened piece of copper to the prong of a tuning-fork and set the fork in vibration, we may cause it to inscribe its motions on a piece of smoked glass, in the shape of a number of waved lines. Again, Professor Romanes (whose recent death is a momentous loss to science) caused a medusa to similarly inscribe its vibrations on a blackened board. On looking at the two impressions, we may readily discern that the graphic results are analogous: we have the same type of rhythm in the two

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experiments. It is clear that both proceed from the same source: molecular vibration, and that the ultimate cause of both is ethereal vibration. The main difference between them is in the immediate causation. The immediate normal cause, in the case of the medusa, is its response to external stimulation by the sea-water. This compels its nervous molecules to exceed and return to their normal rhythms. This action is transferred to the bell causing it to rhythmically open and close. But, it may be asked, why does the sea-water cause the medusa's molecules to respond by rhythm? We reply, because the biophors of the germ-cell of those molecules were derived from the matter-ether and endowed with rhythmic analogues of immaterial potentialities. Again, we reply, for the same reason that reading a work on sound has caused our nervous molecules to metabolize the sense-impression derived from the printed words, into the muscular effect of drawing the bow across the tuning-fork. The medusa is formed to select indirectly from the ether a few rhythms with which its matter-system can synchronize; while our brain assimilates a vast number.

The medusa is a much more primitive product of evolution than we; consequently its metabolic capacity is proportionately limited. All it can show, as the issue of ethereal stimulation, is the opening and closing of its bell. Again, the matter-system composing the fork is a still more primitive product of evolution than the medusa. The fork cannot metabolize at all. All it can now do is to respond to mechanical stimulation by our hand. Then, its molecules are able to transfer to the air a similar rhythmic motion to that of the medusa. The fields of motion of the iron molecules are then extended, as were those of the protoplasmic molecules. Of course, there are many other ways of stimulating the iron molecules; but, in every case, the excitation would need to proceed from another mass-matter system. If that prong were to glow, for instance, it would cause our nervous molecules to metabolize unpleasantly, were we to touch it. But, it could never glow, unless some other mass-matter system transferred its own excess of rhythms to the iron molecules. The prong would never be caused to glow, directly by the ether, because iron molecules cannot metabolize. They

cannot assimilate a sufficient number of ethereal rhythms. Before iron molecules can become factors in metabolism, they must become parts of organic matter-systems.

Another experiment will now help us. Suppose we suspend an india-rubber tube, filled with sand, from the ceiling. We grasp the free end and cause the tube to swing to and fro. It describes curves. Let us stop it, and, by a sudden jerk, cause a bulge. This runs up the tube and back to the hand. We might cause many similar bulges to divide the string, by a succession of jerks; but, mark: we could not raise a bulge which did not represent an aliquot part of the length of the tube. Here are wave motions expressing in visible rhythms what we conceive as 1, 2, 3, 4, 5, &c. Now, so far as we are concerned, these numbers are abstractions: ideas. Some savages cannot conceive anything analogous. They count by their toes or fingers, having no abstract notion answering to numbers. Nevertheless, they must have the potentiality for the conception. It must be impinging on their peripheral nervous ramifications, as one of the "unseen" and "unheard"

series of vibrations to which we have already adverted. What these savages lack is the effect of the mind-environment which has enabled certain parts of our brains to translate the "number"-potentiality into what we call a physiological state. The potentiality for the numerical abstraction is, to the savage, what, to the unjerked tube, is the potentiality to form the rhythmic waves. The savage needs "jerking." We can "jerk" him by sending him a schoolmaster. Whether we shall increase his happiness thereby is doubtful; but we shall certainly enable him to synchronize with the bulging tube. We all know how hard philosophers have worked to discover a famous *doppel-ganger* called mind. Now, this tube, within limits, can form abstractions as effectively as men: its "1, 2, 3, 4" is as accurate as ours. Yet it manages without a "mind." Why do we need a *doppel-ganger* to enable us to do what the tube can do without one? Surely, this implies small regard for our own nobility! The reason society requires a *doppel-ganger* is because society does not often synchronize so perfectly with ethereal rhythms as when its efforts result in "1, 2, 3, 4." Then, it

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is relieved of perturbation by its units: they all respond as does the tube. Depend on this: society has discovered nothing nearer truth than "1, 2, 3, 4"! Society's efforts, in most other respects, to synchronize with ethereal units, are so much perturbed by the waywardness of the rhythmic efforts of its own units, that society is only able to place implicit trust in "1, 2, 3, 4," and what issues therefrom. On this basis, society has made continuous advance in establishing to its own satisfaction what it calls truth. It will believe figures when it will believe nothing else. Where would society be without its arithmetic, its algebra, its calculus? Where would these be if almost every one of its matter-systems could not emulate the india-rubber tube? What a loss to the tube that it cannot synchronize a little further and thus attain a physiological state! We see the cleverness of its performance, just as we see the cleverness of our own, yet the tube must needs remain, for ever, blind to its own perfections. How different from us! We are never, for a moment, blind to ours! We have attained a physiological state. And yet, we are beginning



to realize that our common gratifications from a physiological state are very primitive affairs—just as primitive, in fact, in regard to the potentialities of a physiological state, as is the tube's response in regard to the potentialities of the differential calculus. We are beginning to materially extend the scope of our rhythmic accuracy. That is, we are beginning to synchronize, in more combinations, with ethereal rhythm. We are beginning to recognize that "1, 2, 3, 4" does not prescribe the limits of truth: that art, for instance, is true as well as mathematics: that science will ultimately embrace infinitely higher verities than physics or physiology, at present, can impart. The reason we are beginning to recognize such facts, is that evolution has advanced the correlation of the parts composing the organism called society. Society is a stage nearer the definite coherent heterogeneity towards which the mind-environment is driving it. Depend on this: the mind-environment intends society to be a very efficient performer of rhythmic synchronism. Society is destined, ultimately, to "sing" absolutely in tune. In a few of its "songs," society, as a vocal artist,

is satisfactory. In the great majority, it is woefully "sharp" or "flat." Each of its units has his or her own idea of pitch. But, they have no eccentric notions with regard to the "pitch" of "1, 2, 3, 4." Then, they all "sing" exactly as does the india-rubber tube. Sometimes these "unmusical" units agree not to "sing." They allow a few great "artists"—transcendental philosophers is their label—to occupy the concert platform. This is very unfortunate for the "unmusical" units, because in ninety-nine cases out of a hundred, these great "artists" are more woefully "out of tune" than the majority of the common units. Thus, society acquires pernicious tastes. It becomes partial to false "intonation." However, the mind-environment is beginning to deal, much to their own discomfiture, with these great "artists." We all know the magic virtue of a "name": what gods are fashioned by it for the common herd. We all know how rapturously the common herd will applaud the poor pipe of a decrepit "name." Well, these great philosophical artists are now decrepit. But, unlike some other artists, they are rendered decrepit, not by the

matter, but by the mind-environment. Now, the common herd cannot effectively oppose the mind-environment. They must begin kicking gods off pedestals, so soon as the mind-environment commands. It is thus unfortunate for some "artists" that they are not as other artists!

Reverting to our experiments with the india-rubber-tube, we will now employ, instead, an instrument called a monochord. We will cause its string, as we did the tube, to form bulges, which, however, on account of the shorter length and fineness of the vibrating string, we shall not so readily perceive. If we twang the wire or string of this monochord, we hear a certain musical note—according to the length and tension of the wire. If we then place a movable bridge (part of the instrument) under the central part of the stretched wire, and again twang it, we produce the octave of the first sound. Then, the wire is practically in the state of the india-rubber tube when it divided, through our jerks, into two bulges. Now, this is another confirmation of our hypothesis. As every musician will tell us, and our own experience if we have normal auditory

faculty, will confirm, the octave is the most readily assimilated of all musical intervals. Every normal child, in repeating an air hummed by an adult, will sing it an octave higher. Every non-musical person who thus repeats an air, will sing it, if not in unison, an octave higher or lower. This proves that our sense of tone, like our sense of number, is an innate faculty, and that, so far as concerns the octave, we synchronize accurately with ethereal rhythm. In fact, an Italian physiologist has discovered certain minute organs (said to number three thousand fibres) in the ear (organs of Corti) which apparently vibrate in unison with every sonorous rhythm transmitted to the brain. Continuing our experiment with the wire, or string, we find that a division of a third gives the fifth higher sound than the fundamental. Musicians will tell us, and our ears, if they are fairly efficient, will confirm that the first tone combined with its fifth, form, after the octave, the most perfect concord: that is, the harmonic combination with which we can most readily synchronize. Here, again, we have confirmation of the assumption that a *doppel-ganger* as little controls our

musical as our number sense. However, we have now to notice a great difference. All normal brains synchronize accurately regarding numbers ; or, which here amounts to the same thing, all normal brains vibrate in the same number-rhythms, though some vibrate through a wider range than others. The point is that so soon as an individual responds at all to numbers, he responds as do all others : idiosyncrasy is not a factor. Now, in regard to musical rhythms we know that this is not the case. That is : idiosyncrasy becomes a factor so soon as we pass certain limits of rhythmic combinations. Every two normal ears will respond in the same way to an octave or a perfect fifth, just as every two brains will respond in the same rhythm to the proposition that twice two is four. But, ask those brains to respond to a complex musical product, say a symphony, we find at once an element of discord (especially if they are critics belonging to two "schools" and write in magazines). Now, there must be musical truth, just as there is mathematical truth. Why cannot these critics agree about the symphony, as they can agree that

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twice two is four? Why cannot they be amiable like mathematicians? The reason is because the number-sense throughout its gamut probably involves more rudimentary rhythms than even the simplest part of the musical-sense gamut. In dealing with number-rhythms the brain is probably exercising one of its most primitive rhythmic combinations. Thus, all brains synchronize numerically while few synchronize musically. Mathematical truth is self-assertive. Musical truth is coy. Few find it, and when they find it, are, at first, pelted with choice epithets (witness Wagner). Afterwards they get their pedestals. Why? The finders left the truth as they found it! Exactly. But the mind-environment does not leave men as the truth finds them. The mind-environment compels men to apprehend collectively what, at first, they cannot apprehend individually. Depend on this: when one man discovers truth, the mind-environment will take care that the rest shall assimilate it—nauseous though it be to many. What applies to music, applies to every human response to ethereal rhythm. Truth is in everything, but the few must find it for the many.

If this volume contains truth, it will overcome men as certainly as a plague! The mind-environment will "see to that"!

Accordingly, we conclude that the mathematician has an easier task in discovering truth than has the musician. This ensues from the fact that mathematics is based on certain rhythmic combinations with which all normal minds readily synchronize. The aberrations incident to subjectivity are thus largely eliminated. Of course, mathematics is a manifestation of subjectivity, like every other response of the human organism. But it differs from most other forms, inasmuch as the individual's mathematical subjectivity, so far as he possesses such subjectivity, exactly conforms with the collective subjectivity. Hence, the "personal equation" is practically banished as a factor in mathematical demonstration. But, proportionate to the exactitude of the response is the limitation of the issues it decides. Such issues must themselves arise from the manifestation of the less complex rhythms. Hence, mathematics is useless as a means of verifying physiological phenomena in which the highest

complexities of rhythmic response are manifested. We must apply to such phenomena a less determinate, but more subtle combination of rhythm. So soon as the brain deals with metabolizing agents, it must metabolize beyond the number-sense, and, corollarily, the determination of truth must be the more obstructed by subjectivity. Such truth has to be finally settled by the mind-environment which, in discovering the average of response, eliminates the "personal equation." Then the mass of mankind, on the particular issue, synchronize with the average and coincide regarding truth.

The number-sense may be compared to a fundamental note from which the harmonics have been eliminated. In responding to such a note the brain misses the gratification derivable from the natural mixture of harmonics. We are told that "variety's the very spice of life." Tones without harmonics may be compared to life without variety. Let us condole with those enthusiasts who, for the good of humanity, pursue the science which has no harmonics! No wonder the schoolboy hates figures. Nature



built the schoolboy's father that way—unless the figures represent the credit side of his banking account! Then he evolves the harmonics from the depths of his "inner consciousness." Harmonics, besides affording us most of the pleasures of life, cost us most of its pains, and all its doubts. For men to know truth, the mind-environment must annul their harmonics. This it does for men collectively. Individually, each may enjoy for a time his harmonics. Eventually, society is forced to hear the unadulterated fundamental tone. Then it falls back on its remaining large stock of harmonics. So the process will continue until there are none to fall back on. Then truth will prevail. How men will manage without harmonics we will leave those to decide who have none. What we have to do is to diminish them! Emotional, artistic, many scientific, ethical, political, commercial issues are complicated by harmonics. Men are rendered rascals, philanthropists, moralists, fanatics, by harmonics. When we listen to a sounded piano-string we think we hear nothing but the fundamental note. Really, our organs of Corti

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respond to a long series of harmonics. Helmholtz designed an instrument called a resonator. By applying a series of resonators to our ears we can, at will, cause any harmonic to prevail over all other vibrations, including the fundamental tone. Then we hear the harmonic alone. The mind-environment is society's resonator. Through it society detects the harmonics which perplex it. Then, its "organs of Corti" are enabled to synchronize with truth. We thus see that our physiological response to ethereal rhythm issuing in the number and sound perceptivities, is identical with that of the inorganic vibrating medium. Thus we must infer that both involve response to the same rhythmic series in the ether. We may here just as rationally assume a *doppel-ganger* as the basis of the string's response as of the organism's. The results being the same, we must, until we have counter-evidence, assume the causes are the same. We cannot have more convincing proof of the identity of results than when sense perceptivity and "intellect" establish the conclusion. We see the string divide. Our number-sense tells us the

division is accordant. Therefore, if there is a law of vibration, the string responds to it as we do. Otherwise, the string's vibration would be, to us, discordant. The converse would occur were the string to divide unequally. Then the string's "perceptivity" of accord would not be ours, and our analogy would fail. The same reasoning applies to the sound-sense. Certain rhythmic combinations appeal to us as the most perfectly accordant sound. These are the rhythms to which the string most readily responds. The string's "sound-sense" is the same as ours. To say that we have a sense, and the string has none, is beside the question. We *know* nothing about the string's "perceptivity" beyond what we see and hear. So far, its "perceptivity" is as effective as ours as an exact response to ethereal rhythm: our sense of number and sound is its "sense." Now, it is demonstration that nervous energy depends on molecular vibration. Then, if we prove, as we believe we have done, that our senses of number and tone are duplicated by vibrating inorganic matter-systems, there is no logical escape from the assumption that our

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sense and their "sense" proceed from the same cause: that all nervous molecular vibration originates from the ether, just as does all inorganic molecular vibration. If we exclude the ether as cause, we cannot explain, as phenomenal manifestations, the identical responses. We may offer an apology for an explanation by attributing the vibration, in each case, to different inherent potentialities in the string's and the nerve's molecules. But how, on this assumption, can we account for the uniformity? Shall we say, by attributing similar metabolism to the string's and the nerve's molecules? Then why cannot the string metabolize by sounding without being twanged? Or, conversely, what "twangs" the nerve-molecule? According to my hypothesis, the string's molecules respond to mechanical stimulation, by certain forms of rhythm involving an extension of their normal fields of motion. Such rhythms are identical with certain rhythms in the nerve-molecules. In the latter, these rhythms are metabolized into what we call the perceptivities of sound and number. In the string molecules, the rhythms

are not metabolized, the external excitation being transferred, so far as we know, unmodified, to the air and ether. The nerve molecules receive their stimulus from the ether. The string molecules get theirs from the hand which excites them. Then, if they have no innate preferences, why do they respond to all hands in one manner? Referring to our experiment with the indiarubber tube, Why must the hand synchronize with it, not it with the hand, to ensure a rhythmical response? If the innate rhythmic "sense" of the tube is outraged by the motion of our hand, like the diseased brain, the tube manifests aberration of motion; its rhythm is destroyed. Whatever causes it to vibrate can only cause it to vibrate "rationally" *in one way*. Now, we men have many ways of vibrating rationally, but that does not alter the fact that, so far as it can "think," the tube is as rational as we. Its number-series and combination, its tone-sense, are, so far as they go, exactly ours. It has its idiosyncrasies, as we have ours. If we metabolize to a subjectivity, so, within limits, does the tube. It has a "volition," within its limits, as determinate as

ours. Rigorously considered, our metabolism represents merely an advance on the tube's action. The response to excitation by the tube involves transmutative faculty, just as does the cerebral action which results in our hand motion. As in many other analogous cases, we here find that apparent differences in essence are only differences in degree. Throughout the whole range of phenomenal manifestation by inorganic matter, such "metabolism" as that of the tube or string, in our experiments, is a constant issue. This involves the conclusion that the highest organic, and inorganic systems only differ in response to the extent that the former are able to metabolize directly from the ether, while the latter can only manifest similar function through the interactions of other matter-systems. But, it may be objected, even this distinction is invalid, inasmuch as the innate motions of organic and inorganic systems are derived from the same ether which is constituent of both. Why, as both are derived from ether-points, should we consider organic systems only, as metabolizing directly from the ether? So far as

the writer perceives, we can only answer this question by the empirical verification that, the more complex the system, the more complex is the function. We see that no two complex organic systems of the same type respond, in an identical manner, to the same stimulus, or can one exert the identical stimulus of another; whereas, in the case of inorganic systems, there is identity in responses and stimulations between every individual integration, and another of the same type. If the higher organisms were merely the recipients one from another, and the excitants one of another, the writer cannot conceive the possibility of ideational response. (Such response he, of course, attributes to the higher brutes as well as to man.) Conversely, if organic systems could respond directly to the ether, we could not, without importing a metaphysical factor discountenanced by experience, account for the constancy of interactions. No planetary and stellar activities, such as we recognize, could be scientifically accounted for. Again, unless we assume direct response to the ether by nervous elements, we cannot account for the inconstancy

of such response. Accordingly, in this treatise, we assume that nervous response, involving ideation, is metabolism distinct from that of inorganic systems, and involves a direct response to ethereal stimulus.

To enable molecules to convey sound, they must have a certain density of aggregation. Thus, Hydrogen will not appreciably convey pulses because the molecules of that gas are too far apart. Their innate field of motion is too extended to allow sufficient opposition to the excitation. When we cause a mass-matter system to vibrate in what is called a vacuum, that is, a space containing only ether-points, we increase this effect. Then there is absolutely no resistance. The ether-points are so mobile and elastic as to render impossible the formation of a sound-shell, or film which could react on an adjacent film. Thus we can hear nothing through a vacuum. Again, any inorganic molecule is too stable a matter-system to be mechanically affected by ether-points. Hence, no such molecule can enlarge its field of motion through normal impacts of ether-points. It can only receive through such



points stimuli from other molecules. These stimuli must be sufficiently concentrated to cause a wave of ether-points to penetrate between the stimulating and the recipient molecules. Radiant heat is such a stimulus. This, proceeding from the sun, is the source of all terrestrial excitation issuing in the various phenomena. On the other hand, in nervous molecules, we have systems of which the particles approach in elasticity and mobility the ether-points. Consequently such particles respond directly to ethereal impacts. They respond to such impacts as air-molecules respond to other molecules. Again, as inorganic molecules can transmit to one another their excitations, so can nerve molecules transmit to other nerve molecules their ethereal stimuli. On this fact, in the writer's opinion, are based the phenomena of hypnotism, and analogous manifestations where one "mind" is said to dominate another. Thus, the mind-environment "hypnotises" humanity and governs the destinies of nations. Every idea which occurs to an individual is thus the effect of his idiosyncratic response to ethereal stimulation. The "ideas" of nations,

on the contrary, proceed from the mind-environment. The star-gazing achievements of certain "philosophers" which now affect humanity as do the rain-drops an umbrella, may thus be reserved by the mind-environment for future generations. In the meantime, they seem to represent contemporary futility: the aberrations of idiosyncrasy. On the other hand, society never knows how soon the mind-environment may change these "visions" into granitic "facts!" If we gaze back through our few centuries of national existence we shall recognize many such transformations by the mind-environment. Among the truths most indelibly impressed on humanity are that 1, 2, 3, 4, &c., is a fundamental natural sequence; that twice two is four is an objective fact, and that a tone, its octave and fifth is a fundamental natural combination. The mind-environment will probably not discredit these verifications, so long as mass-matter systems endure. Thus, we have an answer to that famous question: What is truth? It is synchronism with ethereal rhythm. As such synchronism is rendered more difficult to humanity, according to the harmonics with which

it tries to synchronize, men are continually changing their "truths," and the mind-environment decides the changes. So soon as matter began to metabolize, it began to grope for truth. The simpler the matter the more perfect is its truth. The medusa has realized truth more accurately than has the dog; the mathematician, than the physiologist. The more rhythmic combinations are involved, the more aberrations will mislead.

#### *Résumé of Chapter V.*

The stimuli exciting physiological function are always ultimately the rhythms of free ether-particles. According to its systemic complexity, any organ or part will radiate as function a greater or lesser number of excitant rhythms. The function of any part of an organism is ultimately determined by the nervous elements. The brain is preserved as a functioning organ by the visceral activities. Thus, reciprocity of action occurs between the governor and the governed. The brain, in conjunction with the cord, functions through the peripheral nerve-fibres and cells.

Analogy : nerve-fibres and telegraph wires. External rhythms are partly metabolized by the brain into thought-products and partly transmitted to less complex sub-systems of the organism, ultimately permeating the visceral and muscular systems. Prevost's theory of exchanges applicable to organic as well as inorganic structures. The only difference between the responses of such structures is in the extent of rhythm involved : in the number of ethereal vibrations which the structure is capable of assimilating for its own function. The brain's thinking as fully an illustration of the circulation of vibratory excitation between the ether and brain, as is the radiation between two bodies at different temperatures, of such circulation between those bodies. As one piece of iron receives radiation from another, in the shape of heat, so one brain receives from another radiation in the shape of thought. Cerebral heat. Hypothesis of method of transmission through the organism of varied grades of ethereal rhythms. Idiosyncrasy of response. No two brains synchronize alike. Instinct. Humanity as rigidly curbed as are brutes. Enlarged



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rhythmic response involves cerebral fitness. Why scientific specialists do not become active intellectual leaders of men. What we owe to scientific specialists. The next revolution. Newman. The "old parliamentary hand." Matter-systems exchange ethereal excitations extraneous to the proper motions of the particles of such systems. Unseen and unheard radiations, how perceived by certain brains and, by them, transmitted to the rest. Sound not heard through a vacuum is not proof that it does not issue through ethereal excitation. Argument. Complex nervous, unlike inorganic structures, respond directly, by metabolism, to the ether. Grades of response. Metabolism: lobster's ganglia and human brain. Why they differ. Cerebral selection of rhythm. Selection by inorganic mediums involves merely the continuance of their proper molecular motions. Transmission of heat between matter-systems through ether. Analogy to sound-transmission. Metabolism. Fundamental tones. The universe compared to a musical instrument and the mind-environment to its fundamental tone. Collectively, the human brain responds to this tone. Individu-

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ally, the brain perceives but an infinitesimal number of overtones. Sound vibration and sequential division of sonorous mediums. Number-sense implies cerebral synchronism with other vibrating mediums. Illustration and Argument. Subjectivity and the mind-environment. Subjectivity unreliable. Sonorous and nervous vibrations rendered visible. Medusa and tuning-fork. Division of vibrating tube according to numerical sequence. Savages cannot conceive numerical abstractions, but have the potentiality for such conception. The mind-environment renders active the potentiality. Truth and numbers. Society trusts numbers. The tube's synchronism in relation to a physiological state. The physiological state of society. Mathematical synchronism. Mathematical truth. Other truth. Transcendental philosophers. Perceptivity of the octave. Tone-sense, like number-sense, an innate faculty. Organs of Corti. Octave and fifth: division in three parts of vibrating medium. All normal brains synchronize accurately, within their limits, with regard to numbers. Not the case with regard to musical perceptivity. Reason. Musical

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truth. When one brain discovers truth, the mind-environment will compel the rest to accept it. Truth is in everything, but the few must discover it for the many. The mathematician has an easier task than the musician in discovering truth. Reason. Personal equation banished from mathematical response. Mathematics limited in scope. So soon as the brain deals with metabolizing agents, it must metabolize beyond the number sense. Number-sense compared to fundamental tone from which harmonics are eliminated. Tones without harmonics like life without variety. The science devoid of harmonics. Society and harmonics. When truth will prevail. All issues complicated by harmonics. Helmholtz's resonator. The mind-environment is society's resonator. Physiological response to ethereal rhythm issuing in number and sound-perceptions is identical with inorganic response. Proof. Metaphysical "*doppelganger*." The string's sound-sense is the same as the man's. The string's "perceptivity." "Rational" response of vibrating tube. The number-series and combination of vibrating tube. Its transmutative faculty. Difference between organic and inorganic

metabolism. Resistance required for transmission of sound-waves—hence inaudible through ether. Illustration: Hydrogen; vacuum. Inorganic molecules are too stable matter-systems to be mechanically affected by normal impacts of ether-points; but such molecules may be stimulated through ether-excitation derived from other matter-systems. Instance: solar radiation. Nervous molecules, on the other hand, so unstable through complex atomic structure, as to approach in elasticity and mobility the ether-points. Thus, nervous molecules respond directly to ether-point impacts. Other molecules respond to motion transmitted through ether from one matter-system to another. Again, as inorganic molecules can transmit to one another their excitations, so can nerve molecules transmit theirs. Hypnotism dependent on this fact. The mind-environment hypnotizes humanity. Ideas of nations and of individuals. Transcendental philosophers may be utilized at some future evolutionary stage. The best established truths. Answer to “what is truth?” The simpler the matter-system the more perfect and limited its truth.



## CHAPTER VI.

### RHYTHMIC SELECTION.

IF we apply a sounding tuning-fork at the embouchure of a closed organ-pipe, the latter will respond powerfully, if the rate of the fork's vibration synchronizes with that of the pipe. If a thousand forks were similarly applied, the pipe would only respond to its own rhythm. Thus it would select one from among the thousand forks. We must now see whither this fact leads us. We have, from our point of view, established the proposition that nerve molecules respond to ethereal vibration, as do inorganic molecules to other molecules. Thus, only nerve molecules are directly excited by the ether. Again, according to our hypothesis, molecules represent the third stage of evolution, being composed of atoms (the second stage), which atoms are integrations of ether-points (first stage), which points are the materialized potentialities of immaterial energy,

which energy is an emanation from the First Cause. Further, according to our hypothesis, no ether-point can become an integrant of a mass-matter system, whether the mass-matter system be an atom or a planet. Ether-points can only combine with ether points. Thus, the evolution of new types of existent matter-systems can only proceed by the union of matter-systems. On the other hand, to effect the evolution of a new prototype, the atoms or biophors must represent combinations of ether-points differing from the combinations existing in any atoms or biophors which had previously amalgamated. Whether we consider man as derived from the same prototype as the medusa, or from another, does not affect our proposition that a new prototype could only arise at the time when biophors were evolved from ether-points. The later and passive process which we term natural selection, must have originated from active selection among ether-points. According to our hypothesis, these ether-points are materialized rhythms. Then, all future integrations must also be materialized rhythms. Again, if we find that certain

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matter-systems sympathize with one another's rhythms by synchronous vibration, we are, on our hypothesis, led to infer that this synchronism has determined what matter-systems should bodily coalesce to form new systems. Hence, we must infer that matter-systems, like ether-points, combine according to rhythmic sympathy. After the evolution of cells, when they bodily coalesced prior to division, we may assume that rhythmic sympathy determined the combination, just as it now determines the synchronism between the molecules of the fork and of the pipe. No more "conscious" selection would be necessary in the case of such cell-coalescence than in the case of the pipe's synchronism. So soon as organisms could not bodily coalesce to propagate, other selective processes would operate, but, all would involve rhythmic sympathy between the nervous molecules of the sexually energizing organisms. According to Weismann's theory, the biophor is the primitive vital unit. We go a step further back, and account for the biophor as the primitive vital *organism*. The biophor, on our hypothesis, is a metabolizing factor embodying many combina-

tions of ether-points. The analogous inorganic atom is a comparatively simple combination of rhythms susceptible of transient excitation beyond their normal limits, but, incapable of metabolic action. In an earlier chapter, we assumed the possibility of an empirical production of "living" matter. This, on our hypothesis, will never be practicable, because we should have to start the process by combining ether-points into biophors. We are an ingenious type of organism, but the author doubts whether humanity will ever tackle such an enterprise. At any rate, before trying to devise biophors, it would be prudent to commence operations with the attempt to construct an inorganic atom. That would be a comparatively rudimentary performance. We have stated that the biophor is a metabolizing factor. This implies that it can absorb nutriment and multiply. Analogously to unicellular organisms, or to ordinary molecules which are broken up by the shorter light-waves, the biophor may be assumed to divide into two organisms. This it does through the energetic response of its component ether-points, to

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ethereal stimulus. At this stage of evolution, all the components of the organism are in immediate "touch" with their fellow free-points. Later, through the coalescence of many such biophoric organisms, many of the units would be buried in the structure and consequently respond, indirectly only, through their fellow units, to the impingement of free-points, which latter cannot penetrate mass-matter systems, though occupying all otherwise void space. At this stage of its development, we may consider the biophoric organism as the equivalent of a primitive cell. Henceforth development proceeds on the lines laid down by Weismann. Thus, archetypal differences could only arise at that evolutionary period when ether-points combined to form systems. So soon as systems existed, new combinations only, not archetypes, would be evolved.

On our hypothesis, only the peripheral nervous ramifications in the higher organisms directly respond to ethereal impacts. It is demonstration that the rest of a complex organism depends, for vitality, on its nervous constituents. The peripheral ramifications convey ethereal stimuli to

the brain. Some of these stimuli are selected by the cortex and reflected as ideas; others are selected by various nervous substrata which, in turn, deflect the stimuli to visceral and muscular structures. Thus organic "life" depends on the ether, and we apply the principle of natural selection to the ether-points. However, in their case, the term diverges from its Darwinian significance. In the case of ether-points, and all evolutionary products antecedent to the cell, it implies an active selective process analogous to that of the synchronizing pipe. Proportionately with the increase of its somatic parts, the matter-system would become less able to manifest active selection. Preponderant inert substrata essential to visceral function and allied to inorganic systems, would then render the organism more completely the creature of environment and cause the appearance of the phenomenon we call death. Then it would be necessary that life should be transmitted through the mechanism of the germ-plasm. What we have above defined as the matter-environment would, at this stage of evolution, solely control

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the development of the type. Later, as more complex rhythmic function issued through more complex nervous combination, the mind-environment would energize as a controlling factor. Proportionately with the development of what we call subjectivity, this effect would increase, until, in man we find it dominating the matter-environment and tending to the destruction of those visceral activities which have been preserved by the latter. We have already discussed the ultimate issues of this conflict.

This selective process manifested by vibratory mediums is a constant phenomenon. We might take illustrations from the behaviour of gases, water, smoke, flames—all would manifest sonorous synchronism. Moreover, when we apply analogous methods of investigation to light-waves, we find the same selective process. The decomposition of vapours by a concentrated beam of light represents the selective action of the vapours. If we blow nitrite of amyl into a concentrated sunbeam, the vapour is instantly precipitated as a white cloud. It selects special rhythms from the light-waves, as does the pipe from the sound-

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waves, and behaves analogously to a jet of water which is cut up into a number of drops by the sound-wave with which it synchronizes. Again, the changes in the colour of certain butterflies' wings, which Lamarckists have adduced as an instance of the hereditary transmission of extraneous influence (see "Against Dogma and Freewill and For Weismannism"), is a manifestation of rhythmic selection from ether-waves. Here we find certain heat-undulations causing altered development in the insects. The result is that the colour of the wings changes according to climate. The germ-plasm here responds to the ether as a metabolizing factor. Here we have a primitive display of animal subjectivity on the part of "determinants" controlling the development of the insect's wings. Under altered climatic conditions, certain calorific waves have become intensified. Special "determinants" synchronizing with such waves have concurrently become more prominent as developmental factors. It may now be asked: how can complexity of structure be conceived to affect an organism's total response to the ether? How can the brain,



for instance, deal collectively with a vast number of distinct rhythms? How can selection and assimilation be conceived to occur simultaneously so as to issue in metabolism? If we could give a complete answer to the last question, we should be able to explain physiological life. This is beyond our capacity. However, an analogy from a physical phenomenon may enable us to answer the question how complexity of structure can affect the total response to ethereal stimulus. If we mix mechanically nitrogen and oxygen in the proportion by weight of 14:8, the mixture is practically transparent to radiant heat: only an infinitesimal fraction of such rays are intercepted. But the moment the two gases *combine*, the product, nitrous oxide, absorbs some thousand times as much heat as the mixture. Why this enormous difference? Here is the reason. In the first case we had the atoms of the gases energizing individually; in the second case, they co-operated as new matter-systems: molecules. Here complexity of function is seen to result from complexity of structure.

We will now give further consideration to

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synchronism in light and heat vibration. We wish to show that ether-atoms involve the same principle of synchronism as do air-molecules. We may state that all experiments prove that, whatever may be the state of aggregation of molecules—whether gaseous, liquid, or solid—each atom retains the innate rhythmic periods which it inherited from the ether; but that the efficiency as a responding medium, of any matter-system, is dependent, not so much on the number of atoms in each of its constituent molecules, as by the *variety of atoms* (involving complexity) in each molecule. Thus, molecular complexity involves rhythmic complexity. This, again, involves greater susceptibility to ethereal excitation, because more synchronizing ether-atoms will impinge on the matter-system. In nervous elements, as already stated, we find the greatest development of such molecular complexity. So far has this development proceeded that not only does the ether convey rhythms from one nervous matter-system to another, but the most complex nervous systems are able to respond to ethereal excitation, not merely conveyed, but originated

by ethereal impacts. The products of such direct stimulation we call intuition. They are often beyond the responsive capacity of average cerebral structures and must consequently be comparatively ineffective as excitation of matter-system by matter-system. They will remain latent until the mind-environment has suitably raised the average of cerebral response.

By filling a hollow prism with a mixture of bisulphide of carbon and iodine, we may intercept all the light rays of the spectrum. The difference between obscure and luminous waves is merely one of rhythmic period. The longer (heat) waves pass through the prism, because they are "discordant" to the periods of the bisulphide of carbon. The shorter (luminous) waves are of the same rhythmic periods as those of the bisulphide of carbon molecules. The latter accordingly select, just as did the organ-pipe. These heat and light-waves proceeded originally from an incandescent body. This body, say the sun, was also mechanically agitated by internal collisions. Thus, in the case of light, as well as of sound, there is merely transmission of excita-

tion between two mass-matter systems. There is no direct initiative stimulus by ether impacts, as in the case of direct response by nervous molecules. Nor is metabolism an issue. All the mediums do is to return unchanged to the ether, to be by it transmitted to some other matter-system, the rhythms with which they synchronize. But how did the sun become incandescent? By similar interactions in his own system to those between it and other systems: by reciprocity between recipient and emissive constituents. Then, must the sun ultimately receive back what he emits? Not if his mass is becoming more stable, with a consequent diminution of his bulk. Under those circumstances, fewer ether-waves would impinge on his mass and less energy be returned to him; the equilibrium of the universe would be altered. Moreover, were all the motions he emitted to be returned to him, if he became denser through diminished bulk, his internal motions would become less vigorous; consequently, his response would be feebler: he would return less motion than was transmitted to him by other matter-systems.

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And what would become of the residue of motion which did not reach the sun? That would go to other systems, or, failing other available systems, would be appropriated by the ether. We have applied the term "discordant" to heat-waves. It may be advisable to offer a little explanation on this point. Of course, multitudes of discordant ether-waves, as of air-waves, impinge on matter-systems. The effect of such impingement on the system is to cause a tremor. Such a tremor our ears apprehend as noise. For any molecule to respond by synchronism to ethereal or aerial impacts, it is necessary that each imprisoned atom or molecule which initiates the systemic stimulus should advance and retreat coincidentally with the free atom or molecule. Thus, they meet and separate at regular intervals. The longer this reciprocal action continues, the more extended will be its effect through the matter-system of which the molecules are constituents. When the motion has been thus transmitted, it leaves the system as a return wave, or waves, which the ether transmits to other systems. In the case of noise, the motions

are so complicated and commingled that, to our sense-perceptivity, the effect is chaotic, the rhythm of one set of molecules appearing to undo that of others. The system may be rent asunder by such conflict of rhythms and thus transfer to the ether the chaotic motions it received, but there could be no synchronism of response. Whether we deal with the rhythm of a system, or of an atom, synchronism involves the same principle: "unison" in advance and retreat. But, it may be asked, how (on my hypothesis) are we to conceive certain waves as passing through, and others as being intercepted by, the bisulphide and iodine? If, as I propound, ether-points cannot penetrate systems, they cannot penetrate between the molecules of the mixture. Then, what is to convey the residue of wave-motion with which the molecules do not synchronize? Now, let me ask a question. What real explanation can physicists give? So far as I know, they can only offer the assumption of a "perfectly elastic fluid" penetrating all matter and conveying indifferently all motions. This "perfect" fluid involves, as already shown, physical impossibility.

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The "motion" itself, conveyed by this fluid, is (on the current assumption which rejects the older hypothesis of a material heat-substance) a purely metaphysical assumption contrary to experience, or rather, beyond it. I differ from the mechanical physicist in my conception of matter and ether, and I maintain that verified facts are more fully conformable with my than with his assumption. My ether does not penetrate matter-systems. Were it to do so, the hereditary state of each matter-system would vary according to extraneous influences transmitted by ethereal permeation. Experience tells us that matter-systems do not thus change their hereditary states. Biology is particularly emphatic in denying such change in organic matter-systems. While all phenomenal manifestations, on my hypothesis, proceed through sympathetic interactions, involving attraction and repulsion, between free ether-points and those imprisoned in systems, and between the atoms of such systems themselves—each interaction being thus a manifestation of primitive "likes" and "dislikes"; according to the physicist's convention, these interactions are

the product of purely mechanical causes, which latter, however, are only conceivable on the assumption of precedent supermechanical effects. The physicist tacitly assumes a supermechanical base for his logical structure while nevertheless assiduously trying to conceal the foundation by a superstructure of pure mechanics. The two styles of "architecture" do not, in my opinion, constitute a satisfactory edifice. Of course, we know that the scientific conventions with respect to ether and the responses of matter are confirmed by those criterions of truth: equations; still (as we hope to show), as these equations are merely the product of cerebral response to the same rhythmic system which stimulates the inorganic molecules, they must necessarily, so soon as they represent exact synchronism, afford intellectual satisfaction to the synchronizing brains. The only difference between the mathematician's "truth" and the inorganic response by which he tests it, is the difference between his subjectivity and the "subjectivity" of the inorganic matter-system: it is not a difference of essence; merely of idiosyncratic interpretation. There is only



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gradational difference between the synchronism which transposes into a mathematical abstraction a certain inorganic response and the response itself. The mathematician obtains "truth," as does the matter-system with which he tries to synchronize. Beyond this, he transmutes a synchronous response into sensually apparent symbols, while the inorganic system *acts* the "truth" without effecting such transmutation.

We will now proceed to answer the question how, on our hypothesis of the impenetrability of matter-systems by ether, the bisulphide of carbon and iodine mixture apparently allows itself to be permeated by certain ethereal waves while intercepting others. In our example we have an instance of opacity to light and transparency to heat-waves: otherwise transalency. On our hypothesis, every response of matter involves the acceptance or rejection of specific rhythms by the molecules of that matter-system. These rhythms, in the case of the highest nervous structures are sometimes derived directly from the ether. However, in the majority of cases of organic, and in every case of inorganic response, the response is

to rhythmic excitation conveyed by the ether from one matter-system to another. The ether-points are thus perpetually receiving and transmitting motions, and matter-systems are similarly receiving and radiating motions beyond those inherent to such systems. Certain rhythms impinging on a special matter-system cause its molecules to transiently augment their innate rhythms, just as various extraneous influences involved in environment cause an organism to transiently exceed its normal activity. In the case of the molecules of such a system this augmentation of rhythm involves synchronous response issuing into (according to physics) absorption and radiation; and (on our hypothesis), transparency and transcalency. Other rhythms similarly impinging may be repelled by the molecules. This involves reflection. Sometimes reflection and absorption occur simultaneously. Then, the result is called decomposition and irregular reflection, or diffusion, of light. By its diffusion, we distinguish one matter-system from another. Thus, a "red" poppy synchronizes with all luminous rhythms except the red. This,

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reflected, enables us to determine the colour of the flower. On our hypothesis, as ether does not penetrate matter-systems, there can be nothing within such systems to transmit motion, beyond their molecules. Then, if the molecular rhythms do not synchronize with the ethereal impacts, the extraneous motion will be rejected by the system. Thus, according to our hypothesis, the bisulphide of carbon and iodine mixture absorbs not only the light rays to which it is opaque, but, also the heat rays to which it is transparent. The difference between the two absorptions is, from our standpoint, merely one of degree of permanency in the respective rhythmic disturbances involved in the transparency and opacity. In the transparent manifestation, the heat rays are instantaneously absorbed and transmitted, while in the opaque manifestation, the light rays cause a more permanent amplification of the normal systemic rhythms. Thus, there is, on our hypothesis, no need to assume a penetration of the molecular constituents of the mixture, by the ether. The molecules simply manifest selective activity, conformable with their hereditary endowments.

We cannot sensually apprehend the objective realities we symbolize as light, heat, or sound. All the individual can thus apprehend, as we shall later show, are the responses of his own organism to certain imparted motions which we call light, heat, or sound, according to the particular sense-perceptivity affected by the motion. That one substance is opaque, another transparent to light, does not mean that the light itself penetrates one rather than another substance. It merely implies, as already explained, that particular motions affect the normal rhythms of such substances in different manners, so that corresponding differences in effect occur to our sense-perceptivities, and the substances manifest idiosyncratic responses to the same stimulus. That a sheet of glass is transparent to our visual sense by no means involves that there is an objectively essential difference between the response of the glass to light, and the response, say, of a sheet of silver. It merely means that certain motions are more readily transmitted through glass-molecules than through silver-molecules. That we can "see through" the glass, but not through the silver, involves

that certain nervous molecules conveying special stimuli to the brain, respond to the motion of the glass-molecules, stimulated by ethereal impacts, in the particular manner involving the subjective experience of transparency. However, this effect is conditional. It is well-known that, in sufficient thickness, all substances are opaque to light, and conversely that, in sufficient thinness, such substances are transparent. Thus, a certain number of sheets of glass give us the sensation of opacity, while a sufficient thinness of silver applied to the object-glass of a telescope enables astronomers to gaze at and examine the sun, without inconvenience. This proves that transparency and opacity are dependent on the conduction of particular motions by the molecules of matter-systems, independently of any supposed ether permeation; because, if ether did so penetrate, a transparent medium would not become opaque through thickness. If the ethereally-conveyed motions called light cause the molecules of the responding substance, say glass, to transmit from one to another through the system, a sufficiently rapid succession of vibrations, the

effect on human subjectivity is that of causing the eye to respond to diffused reflection permeating the particular substance from adjacent matter-systems: in other words, the eye sees through the glass, receiving the diffused reflections through the mediation of the glass as well as the atmosphere. It is probable that organisms exist capable of reacting to what we call opaque bodies as we react to glass. In fact, it is well-known that in certain cases of *hyperaesthesia* the sensation of vision may be derived through conventionally opaque bodies. Thus, Sauvaire instances a case of hypnosis in which the medium recognized non-transparent playing-cards by the light transmitted through them. Similarly, Taguet used a piece of ordinary cardboard as a mirror. When he held it before the medium, objects were seen as reflected by a mirror.

To explain the varying conductivity of matter for ethereal motion, it has been assumed that the molecules have varying degrees of capacity for yielding back their motions to the ether supposed to permeate them. Thus, the motion is absorbed by the internal ether of certain matter-systems, sooner than of others. Good and bad "con-

ductors" are supposed to be decided on such conditions. But, how does this accord with the other common assumption that sound cannot be conveyed by ether? If ether conveys all motions, why should it not convey sound? This is the product of molecular vibrations, as is heat, and, as assumed, the ether penetrates the air-molecules as well as the "vacuum." Again, if ether penetrates matter-systems and conveys indifferently all motions, how do the molecules of a matter-system abstract the motion from their contained ether—why should any matter-systems be "opaque" to ethereal motions? How can molecules be "opaque" when, on the assumption, there is the contained ether to transmit the same motion as was transmitted by the external ether? Again, how are we to conceive ether as impressing on integrated molecules the motions communicated by other integrated molecules, if it penetrated those molecules? If it could get through, over and under them, it would convey through every system indifferently; or rather there would be nothing for it to convey. It could not act as a transmitter of motions between the molecules of different

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matter-systems, because it would offer no resistance to translate such motions. Thus, the assumption contradicts the current theory of transmission of radiant energy, and posits an impossible combination. It propounds mechanics and involves metaphysics, to the confusion of both. On my hypothesis, matter-systems are not mechanical, but hereditarily choosing agents. The first matter-system is a free atom (second stage of evolution). The second matter-system is a free molecule (third stage of evolution). The third matter-system is any coherent agglomeration of molecules (ponderous matter). Ether cannot penetrate a free atom or molecule, or a system of molecules, but it occupies all space between such systems. This involves that every matter-system responds only to external ether, and that all systemic units inherit their rhythms from precedent units. According to their variety of contained units, matter-systems are more or less responsive to ethereal stimulus. The diffusion among systemic units of external excitation will depend on the innate characters of those units. Like a biophor of a germ-cell in a sexual organism, every integrated



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atom within an organism is beyond direct contact with external influence. Then, its peripheral "nervous" units must transmit excitation through the system. Thus the ether directly, from without, affects a free atom or molecule; an organism, a nation, a universe. Each of these products is a "free" system affected as a whole by the ether. So soon as a grosser mass matter-system is disintegrated into its constituent molecules, or atoms, these revert to their free state. This represents the "death" of such a system. On this hypothesis, the "death" of molecules, organic and inorganic, implies their disintegration into biophors and atoms. The "death" of biophors and atoms would be their disintegration into ether-points. The "death" of these would be their reversion to the state of supermechanical energy. This would revert to the First Cause.

If this hypothesis be wholly true, the brain which conceives it will synchronize as accurately as does an expert mathematician's with ethereal rhythms. Moreover, the synchronism involved in the former process of investigation would cover a far wider range of rhythm than mathematics

can deal with. If the hypothesis be partially true, some other brain or brains will synchronize more effectively and eliminate the fallacy. If we could see and hear what the writer conceives as hypothesis, we should not increase the truth of the hypothesis. We should merely derive assurance from forms of perceptivity which have often deluded us. Humanity is credulous when "eyes" and "ears" offer evidence. When "brains" only are in the witness box, humanity is as sceptical as a Bow Street stipendiary! It seems to the writer that certain experiences should, by now, have rendered men less confiding than they are, with regard to "seeing" and "hearing." But, whatever ideas on the subject he may privately entertain, the writer is quite aware that "seeing" and "hearing" will, for some considerable period, to the mass of mankind, mean believing. In fact, so convinced is the writer on this point, that his main effort is to render his conclusions, as plainly as possible, inevitable growths from "seeing" and "hearing." Assuming that these perceptivities are worth believing, he wishes to show that certain "invisible" and "inaudible"

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phenomena are the inevitable corollaries of what we can "see" and "hear:" that, just as many men are colour-blind, so others—until a friendly jolt arouses their dormant faculties—may be "blind" to other phenomena, as cogent as are unseen luminous radiations. In fact, we wish to convince men that they have not yet ascertained how many senses they possess! We have shown that we synchronize with inert matter when we conceive "1, 2, 3, 4." We see that this must be the case because the vibrating string also "conceives" the numbers. Now, we will go a step further. Every "fact" which physicists demonstrate through manipulating "1, 2, 3, 4" is more effectively "demonstrated" by inert matter. This is a more efficient mathematician than is the physicist. Why? Because the criterion of truth is not the physicist's calculation, but the empirical proof that his *formulae* are also the matter's "*formulae*." He, himself, cannot rely on his deductions until the inert matter has confirmed them. If the procedure were reversed: did the inert matter defer to the physicist's calculation—then we should have to allow that the physicist was the more exact

mathematician. The reason why the inert matter "calculates" better than the physicist is because it cannot metabolize: its selective range is rigidly limited. It has so few rhythmic alternatives that it cannot select a wrong one. The instability of the physicist's nervous system, while vastly enlarging the scope of his responses, bewilders him with alternatives. To select accurately, he has to pursue a laborious system of checking responses by counter-responses. When, ultimately, he succeeds in selecting, as does the inert matter, he is satisfied: then, he has won truth. To state the case in a few words: the physicist achieves by reason, what the inert matter achieves—if we may apply the term without affronting our own nobility—by intuition. What intellectual strides we should take, could our physicists emulate the inert matter! Then we should perceive that all science was one science. Then, no self-sacrificing mortals would need to dwell in a realm of monotonous fundamental tones. Then all might revel in harmonics. Then, our poets would be mathematicians and mathematicians, poets. What dreary "grad-grinding" our natural philosophers would have

escaped, had they been endowed with the intuitive accuracy of an atom of sulphur or oxygen! Then, no Dalton would have been awaited for tens of centuries to tell men the law of multiple proportions. Men would have conceived this law as surely as they conceived "twice two is four." Here, elements have been combining for untold ages, in the same sequential order we have combined "1, 2, 3, 4," and we have been trying, for thousands of years, to discover the fact! That is the penalty for being able to metabolize: to select at our option. When we conceived "1, 2, 3, 4," we selected as rigidly as do the elements. When we metabolized an infinite series of permutations from our fundamental rhythms, we began to deal in "options:" a risky proceeding, as every "bull" and "bear" knows!

Now, let us make a further application of Dalton's discovery. According to the law of multiple proportions, when two elements combine in different proportions as to weight, simple multiple relations exist between the combining elements whose weights differ in the respective compounds. Thus, mercuric oxide and mercurous

oxide are two combinations with distinct properties, of mercury and oxygen. In the former, the proportions by weight are  $12\frac{1}{2}$  parts of mercury to 1 part of oxygen. In the mercurous oxide the proportions are 25 parts of mercury to 1 part of oxygen. There is thus a proportion of 2 : 1 between the mercury in the respective compounds. If we refer to sound vibrations, we find, as already shown, the same principle in operation. A vibrating string first divides into two parts. This represents the octave, the most perfect consonance, and the proportion 2 : 1. The next division is into three parts. This represents the fifth, the next harmonic combination with the fundamental in degree of consonance, and the proportion 3 : 1. We might thus say that the mercury in the mercurous oxide is the octave of that in the mercuric oxide. A complete application of the synthetic method will, I surmise, enable us to largely modify our "propound ignorance of the ultimate constitution of matter." The essence of all truth is synchronism between the ether and corresponding matter-systems, whether they be organic or inorganic. In fact, the distinction

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between organic and inorganic is really arbitrary. In metabolizing mediums, truth becomes animalized; but, so also it becomes "animalized" in inorganic systems. The difference between the manifestations is merely of degree, not essence. Whether truth be manifested as a poem, a symphony, a mathematical demonstration, or the vibration of a string, it is fundamentally one and the same manifestation. All truth is contained in the ether. Matter-systems, according to their evolutionary stage of complexity, realize a greater or lesser proportion of this truth. Some systems can only discover their proportion of truth, through the matter-environment; others, more advanced evolutionary products, can only realize their full proportion of truth through the mind-environment. This involves a collective response to ethereal stimulus. The more rudimentary the truth, the more rudimentary will be the response needed for its apprehension, whether such apprehension be that of the infant, the puppy, the polype, or the inorganic element. This truth is realized by individual, as distinct from collective, response. Every sense-perceptivity being, in itself,

a response to the ether, must be true, just as is every vibration of a string. When, however, two strings vibrate together so as to produce a harsh discord, the *combination* is untrue. Incandescent gas issuing from a jet will recognize the "fallacy" as clearly as will a human brain, though the former's "subjectivity" will not manifest recognition as does the latter's. All fallacy is false combination of individually true responses. The lunatic's perceptivities are individually true. His combinations are false. Sane men are, in respect to many combinations, as inefficient machines as are lunatics. All the dissensions of humanity proceed from this cause. Sane as well as insane people require the care of the "mad-doctor." The mind-environment is the physician who treats sane people. Thus, education, by placing us all under the control of the mind-environment, is the greatest benefactor of humanity. Those who fight against education manifest the most dangerous form of lunacy. They are as irrational as the son who tries to strangle his mother. Many people oppose education, but are valiant for "morality." Why? Surely education



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is "moral"! These people say it is not. Why? Because it "knocks the bottom out of" shams. Because it is honest? Undoubtedly. It cares for nothing but truth. And "morality" does not care for truth? It hates it. Did you ever know a rogue who loved honest men? "Morality" is a rogue! And rogues are insane types. They are the results of false combination. The mind-environment is trying to eliminate them. It will succeed. The more closely humanity is able to imitate the certainty of the rudimentary selection manifested by inert matter, the nearer will be the "millennium." At present, humanity's gamut is so extensive as to be beyond control. Like the anxious hen who sees her ducklings nonchalantly taking to the water, humanity is perplexed by its gamut. If we may add another simile, our perceptivities may be compared to a mob of recruits before the drill-sergeant has taken them in hand. Humanity's drill-sergeant is the mind-environment. It is teaching us how to select and combine. To enable us to select and combine accurately, we must entertain clear ideas as to what we intend to select and combine. To

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attain such ideas we must study the behaviour of inert matter: we must learn to recognize harmonics and combine them, as the vibrating string selects and combines them, into a coherent whole. Then we shall become collectively sane. Human sense-perceptivities are individually true. Each was once a separate entity, and, as it then responded to its fellow free units, so does it now respond to them. Evolution has combined multitudes of such entities in the human brain, but it has not yet enabled them to respond to one another as each responds to its free fellow. They have yet to learn how to synchronize collectively, just as have the larger matter-systems constituting humanity. In some few brains, these units do thus synchronize collectively; but, in the generality of brains, the units may be compared with the recruits: they are a mob. The average human brain is a matter-system which has not yet been evolved into a coherent heterogeneity. If this is the case with regard to brains, it must also be the case with regard to the societies which those brains constitute. A system that is defective near its foundation cannot be efficient near the apex.

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However, though evolution works slowly, it never fails ultimately. It means to have humanity a definite coherent heterogeneity.

*Résumé of Chapter VI.*

If we apply a tuning-fork at the embouchure of a closed organ-pipe, the latter will respond powerfully, if the rate of the fork's vibration synchronizes with that of the pipe. If a thousand forks were similarly applied, the pipe would only respond to its own rhythm. Thus it would select one from among the thousand forks. New organic prototypes could only arise at the time when biophors were evolved from ether-points. All the later processes to which we apply the term natural selection, must have originated from the natural selection of ether-points. Ether-points are materialized rhythms, then all future integrations must also be materialized rhythms. Matter-systems, like points, combine according to rhythmic sympathy. Cell-conjugation involves rhythmic sympathy, as does the response of the organ-pipe. "Conscious" and "unconscious" selection. Later processes of selection through rhythmic

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sympathy of nervous structures. Weismann's theory. We go a step further back. The biophor a metabolizing organism. Inorganic atoms and biophors. Empirical production of living matter. Only the peripheral nervous ramifications, in the higher organisms, directly respond to ethereal impacts. The rest of a complex organism depends for vitality on its nervous constituents. How ethereal stimuli permeate the organic substrata. Natural selection applied to ether-points, and shown to be distinct from the later passive process. When the matter-environment would cease to be the sole controlling factor in organic evolution. Illustration of selection by vapour. Changes in colour of butterflies' wings. How complexity of structure changes responses to ethereal stimuli. Illustration: nitrous oxide. Analogy between ether-atoms and air-molecules. Intuition a product of direct cerebral response to the ether. The mind-environment and intuition. Selection of radiations by bisulphide of carbon. Analogous selection to that of organ-pipe. Light and sound involve merely transmission of excitation between matter-systems. Unlike the

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response of nervous molecules, the above manifestations are not the issue of initiative stimulus by ether impacts. In the cases of light and sound, the ether conveys, but does not initiate beyond normal motion. There is then no metabolism, merely a return to the ether of transmitted rhythms. Extinction of the sun's energy. Consequences. Noise. Discordant ether- and sound-waves. Unison in advance and retreat essential for synchronism to occur. Ether does not penetrate between molecules integrated as systems. Argument. Explanation of the transmission of ether-waves on the assumption that ether does not penetrate matter-systems. The conventional assumption of the penetrability of matter by ether examined and controverted. Mathematical truth and rhythmic synchronism. Difference between mathematical truth and inorganic response to ether. Opacity and transparency—what they really are. Reflection, absorption, diffusion. Transparent and opaque absorption. Why substances are opaque and transparent. Transparency of silver and opacity of glass. Hyperaesthetic vision through opaque substance.

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Good and bad "conductors." Integrated atoms compared with biophors in germ-cell. Every integrated atom within an organism is beyond direct contact with external influence. Free atoms. Free systems. "Death." The delusive character of sense-perceptivity. Invisible and inaudible phenomena the inevitable corollaries of what we can see and hear. The vibrating string a mathematician. Why it is more accurate than the physicist. Rhythmic alternatives involved by nervous instability. The physicist achieves by reason what inert matter achieves by "intuition." Intuition. Law of multiple proportions. Dalton. When we conceive 1, 2, 3, 4, we select as rigidly as do the elements. When we metabolize an infinite series of permutations from our fundamental rhythms, we deal in "options." Numerical sequence in chemical combination. Mercurous and mercuric oxides. Comparison with vibrating string. Essence of all truth. Distinction between organic and inorganic really arbitrary. Reason. How matter-systems realize truth—the infant, the puppy, the polype, the inorganic element. Every sense-

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perceptivity being, in itself, a response to the ether, must be true, just as is every serial vibration of a string. Discord. False combination. Discord recognized by flaming gas. All fallacy is false combination of individually true responses. The lunatic's perceptivities are individually true. His combinations false. Sane men and lunatics. The mind-environment the physician who treats sane people. Education. Those who oppose it. "Morality." Rogues are insane types. Their false combination: Human perceptivities compared to a mob of recruits. The mind-environment humanity's drill-sergeant. Brains which synchronize accurately and inaccurately. Societies compared with individuals.

## CHAPTER VII.

### ATOMS.

THE law of multiple proportions is the foundation of the Atomic theory, and, this embraces the fundamentals of chemical science. The absolute weights of atoms cannot be determined, but chemists have satisfactorily, from their point of view, established the fact that atoms vary in weight. Thus, they have formulated a list of relative atomic weights, that is: weights in relation to a standard. For instance, the weight of an atom of Oxygen is 16 in relation to that of an atom of Hydrogen which is 1. The similar relations to Hydrogen, of Nitrogen and Chlorine are 14 and 35.5 respectively. Now, it is found that no molecules of Oxygen, Hydrogen, Nitrogen, Chlorine (this also applies to the other elements) compounds contain more or less than exact multiples of the respective atomic weights. Thus: no Oxygen-compound contains less than 16 parts by weight of Oxygen; no Hydrogen-



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compound, less than 1 part of Hydrogen; no Nitrogen-compound, less than 14 parts of Nitrogen; no Chlorine-compound, less than 35.5 parts of Chlorine. Again, if any Oxygen-compound contains more than 16 parts of Oxygen, it cannot contain less than 32; if more than 32, it cannot contain less than 48, and so with the other elements. We thus find that sequential combination is as characteristic of chemical as of sonorous phenomena. The compound, like the vibrating string, "conceives" sequentially. Now, it will be remembered that, on my hypothesis, chemical atoms are hereditarily derived from ether-points, and atomic complexity depends on the number of diverse ether-points contained in the atom, just as does the complexity of a biological "id" depend on the number of its diverse biophors; of a germ-cell, on the number of its diverse ids; of a nation, on the number of its diverse individuals. My hypothesis, accordingly, so far, conforms with chemical theory, inasmuch as the more ether-points are contained in an atom, the more that atom will weigh. But, mere difference in weight cannot account for the

varied activities of atoms. Chemistry tells us the fact of these atomic manifestations, and endeavours to account for them by a theory attributing varied motivity to the atoms. Still, we want to know the origin of the motivity. Accordingly, we must find a better explanation of the properties of atoms than either chemistry or physics propounds.

We thus see that atoms, molecules and matter-systems energize according to rhythmic sequence. That proportions by weight of elements combine according to the same numerical series as do the particles which constitute sonorous, luminous, and nervous mediums, involves that the rhythms of all matter-systems are governed by one and the same law, and that the atoms of such systems are the ultimate responsive factors. We find 1, 2, 3, 4, as sequence, innate to Hydrogen, Oxygen, Carbon, Nitrogen, Chlorine atoms. We find the sequence innate to the atoms of all sonorous and luminous mediums. We find it innate to the atoms of the highest types of nervous mediums. We can no more compel a string to "perceive" harmony in an unequal division of its parts, than

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we can compel a mathematician to believe that twice two is five; or, than we can compel 17 parts of Oxygen to combine with 2 parts of Hydrogen. Oxygen atoms have "determined" that 16, 32, 48—not 17, 33, 49—are accordant sequences, exactly as the mathematician and the vibrating string have determined the accordance of 1, 2, 3, 4—not 1,  $2\frac{1}{4}$ ,  $3\frac{1}{2}$ ,  $4\frac{1}{8}$ . Oxygen combines just as do the string and the musician. The "brain" of Oxygen responds, within its limits, exactly as does the brain of the mathematician or the musician. Then, as atoms composing the molecules of sonorous, luminous, chemical and mathematical mediums have the same idiosyncrasies with regard to sequence, we are justified in inferring that they have the same origin. The next question to decide is whether such atoms originated themselves, or whether we must look elsewhere for the first cause. Now, we maintain that the assumption of atoms as the first cause of their own existence, involves that they are supermechanical factors. This is inevitable, on the assumption. Why? Because these primordial atoms must have contained potentialities

immeasurably transcending their initial manifestations, and, if they contained such potentialities, they must have been able to exert them as fully as do their posterity embodied in nervous elements. If primordial mechanical atoms could not exert such potentialities, we cannot account, on the assumption, for the fact that their posterity do exert them. There is no source outside the atoms themselves, and, so far as we know, mechanical agents are not in the habit of evolving more functions than they originally possessed. Suppose, again, we assume that the atoms have all the necessary potentialities, collectively, but not individually, it would be, to say the least, so far as concerns human experience, a remarkable fact that just so many atoms had evolved themselves with just so many potentialities as would suffice for the evolution of the universe, and, being mechanical atoms, had so collaborated as to effect the phenomena of evolution. We are a credulous type of organism, but I am scarcely sanguine enough to expect humanity to "swallow" such an atomic miracle of collaboration. All the creeds of the world

would be a morsel compared with such a Gargantuan *bonne bouche*! The ultra-materialist does not tell us whether all his atoms came at once into existence. If they did not all arise together, they must have multiplied. Now, we know of no purely mechanical agent which is capable of self-propagation. This, imputed as a faculty to mechanical agents, involves a contradiction in terms. It is inconceivable and dead against experience. Therefore, we scout such an assumption as completely as we scout the mystic "creation" of theologians. We maintain that every practicable hypothesis must, like every organism, be a strictly evolutionary product: that its connection with antecedents must be apparent to human perceptivity. Then, if a comparatively few primordial atoms did not multiply so as to ultimately embrace all the constituents of the universe, these atoms must have come into existence at once. This amounts to a special creation, or a self-creation, of atoms. On our hypothesis, it will be seen that we accept "creation," to the extent of a creation of ether. The difference between our "creation" and that of



theologians is, that ours is conformable with experience, inasmuch as it involves evolution, while the hypothesis of theologians is not conformable with experience. Of course, we know that theologians are now making a vigorous attempt to adjust their own conceits to experience, by twisting their "creation" into evolution; but, the futility of this procedure is patent to all rational and informed men, except theologians. On the purely mechanical hypothesis, we can assume no such "creation" as is necessitated by our doctrine, or that of the theologians. On the mechanical hypothesis, we cannot assume a beginning for the atoms: they must be self-evolved infinities. Thus, the ultra-materialist is in a *cul-de-sac*. His mechanical hypothesis is self-demolished. He must simply apply to his atoms the same attributes as the theologian applies to his anthropomorphic concoction, and we apply to our First Cause. Thus, the Ultra-materialist unconsciously betrays himself as the rankest adherent of preternaturalism. Each of his atoms is a first cause, therefore, each is a supermechanical factor. He is the "miracle"-monger, *par excellence!* The

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physicist who propounds a "perfectly elastic medium" not composed of disjunct particles, is in a like quandary. He must invoke metaphysic to explain his medium. Undulatory motion propagated by vibrating molecules through absolute mass, involves the incomprehensible. Something must move to transmit motion. To assume that an absolute mass-ether moves at the instigation of molecules, is to assume, according to our experience, impossibility. As already explained, on our hypothesis, the primordial atoms are not merely mechanical factors. They are active agents with innate likes and dislikes. They are the materialized manifestation of immaterial energy. We do not offer this definition merely as an assumption. We affirm that it is based on demonstration. The demonstration is afforded by the behaviour of the matter-systems within range of our scrutiny. Science proves that all such systems are composed of atoms and that, through the selective energy (not essentially differing from what we call "choice") of their atomic constituents, these systems themselves energize as selecting entities.

Then, the atomic constituents must be super-mechanical agents. If we could not demonstrate the fact of active selection with regard to atoms, we could not demonstrate it with regard to systems. Then, the mechanical hypothesis, as fully as our own, would fall, because the ultra-materialist, equally with ourselves, must base his assumptions on atoms. So soon as we prove that matter-systems manifest active selection, we destroy the assumption that their components do not manifest it, because we cannot account for the selective energy of systems except as the product of the selective energy of atoms. To what degree an individual atom possesses such energy has no bearing on the question whether that atom is a mechanical or a choosing agent. So soon as we grant *any* selective activity we destroy the mechanical assumption. And, unless we grant some such activity to the atom, we cannot account for any such activity in the system.

The ultra-materialist as well as the theological "miracle"-monger may offer a few plausible objections, beyond attempting to establish their



own hypotheses. Thus, they may say: why did this supermechanical energy trouble itself with the drudgery of evolution? Why did not it make a "clean job," by "creating" the universe and all its contents—or rather, all the contents which are ultimately to people it? The answer to this question is similar to that we offer the "free-will" advocate. We say: evolution is established by evidence conclusive to reason. Why the universe did not come into existence ready furnished is no business of ours. The question for us is not: Why did not something else happen? It is: Did this happen? Again, the writer would retort: If "creation" were the method, why should poor humanity have had its head cracked so often for the sake of two particular products of "creation"? Why should "creation" itself not have made a "clean job"? In fact, why should creation not be "creation," but evolution?

A child can ask more questions than a sage can answer. The man emulates his father, the child. Children will ask questions longer than will men. The vibrating string is so enslaved that its harmonics manage it. They will not let it ask

questions. Men are so free that they manage their harmonics, and, as often as not, betray their incapacity as managers by asking questions. When their harmonics manage men, they will no more ask questions than does the string. Atoms are thus active selecting agents. They use, within their limits, a discriminative method corresponding to the action of the matter-systems, whether organic or inorganic, of which they are constituents. Let us instance a few representative cases. Calcium will not combine with Hydrogen, but it will combine with Chlorine. Iodine intercepts light-waves, but it is practically transparent to heat-waves (these waves merely differing in regard to length, so physicists tell us. If we accept this conclusion of physicists, we are, as already shown on the mechanical hypothesis, utterly unable to explain how the particles generating such waves have originated their motions). Any sonorous medium vibrates in sympathy with a particular note, and no other. The cause of this selective process, universally prevalent, is, we affirm, in all cases the same : discord and accord between atomic rhythms. When there is accor-

dant rhythm, the atoms select ; when the rhythm is discordant, they reject. If we could measure the rhythms of an atom of Chlorine and one of Calcium, we should find them accordant. If we could similarly measure the specific rhythms involved in the ultra-red ether-waves, we should find discord between them and the vibratory periods of the Iodine atoms : a tremor would, no doubt, in the latter case, be caused by the discordant impacts, but no such cumulative action as is necessary to the manifestation of rhythmic accord could arise. Of course, this applies also to the sonorous medium. In all these cases, accord involves rhythmic synchronism. In the non-chemical manifestations, the synchronism is excited through an intervening medium. In the chemical instance, it is manifested independently of such intervention : through contact between atoms. Even when we reach primitive metabolizing matter-systems, we still find contact necessary to the manifestation of rhythmic accord. Such instances are afforded by the conjugation of cells, where one matter-system bodily coalesces with another for the purpose of

reproduction. As we proceed higher in the scale of organism, we find that mere physical contact is superseded as an initiative excitant, by stimulus conveyed through the ether: we find organism exercising what we call psychical processes of selection, through stimulation of nervous elements, involving visual, auditory, and "intellectual" faculties. Here, the purely "chemical" process is superseded by one involving the intervention of a transmissive medium. The response to stimuli becomes complicated by the organism's "harmonics": nervous metabolism now initiating the process of selection. In the human type, the basic "chemical" process is usually secondary to the "psychic." Here, direct selective response to ethereal stimuli supersedes the primitive response to contact. In certain human organisms, this process has so far progressed, that their reproductive instincts are practically annihilated. Did these individuals constitute the type, that type would soon cease to exist. The more completely a type is evolved beyond the "chemical" selective stage, the more precarious becomes its tenure of existence. We see this exemplified in the cases

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of human individuals and societies. The more fully they are under the dominion of the mind-environment, the less effective is the matter-environment to preserve their procreative efficiency. As already stated, the predominance of the mind-environment involves the ultimate extinction of mass-matter. Still, rhythmic response by the highest nervous structure is as essentially dependent on atomic synchronism as is the most primitive "chemical" manifestation. Both have the same Origin and both will, no doubt, ultimately revert to that Origin. However, evolution has much to effect before that happens. Evidence leads us to conclude that the highest nervous organism now existent is in a primitive stage of dominion to the mind-environment: that future types will as far transcend the former, as it transcends aboriginal humanity.

We have already discussed the question: How could mere combination of atoms radically alter the response to ethereal stimulus? We adduced the instance of the behaviour of two gases individually and in combination. We showed that,

the moment combination takes place between Nitrogen and Oxygen in the natural ratio of 14:8, these combined gases have many thousand-fold increased their absorptive capacity with respect to ethereal vibration. As a mere mixture, the gases allow heat-rays to pass through them as through a vacuum; as the above combination: nitrous oxide, they absorb an enormous number of such waves. There is nothing but the fact of combination to account for the difference of response. The individual atoms are the same in the combination as in the mixture. So it is with regard to the atoms composing nervous molecules. It is their combination, not the individual atoms, which ensures the intensified response to ethereal rhythm issuing in cerebral metabolism. In the ether, the components of biophors, like those of chemical atoms, are simply mixed. In nervous matter, there is the most complex combination of multitudinous atoms, which, moreover, in themselves, are far more complex than chemical atoms. No process within the scope of chemistry has so far attained a combination of the elements of protoplasm. Compared with such synthesis, all

chemical processes are crude and rudimentary. Dead protoplasm consists of albuminoids, phosphorous compounds (lecithin and nuclein) and, in addition, probably cholesterin; such carbohydrates as glycogen, starch, inulin and dextrin; compounds of potassium and water. Each molecule of protoplasm, it will be seen, must be a complex product of evolution. On our hypothesis, each protoplasmic molecule is composed of biophors. These life-atoms, like the atoms of chemistry, are coherent wholes. But, the greater complexity of the former, involves proportionately greater instability in the compounds issuing from their combination. At some distant epoch, when humanity, through the mind-environment, has attained to more exact synchronism with ethereal rhythms, chemists may be able to synthesize the elements of protoplasm. Should such an event occur, it would be tantamount to ethereal synthesis through synchronizing cerebral mediums. Personally, we have no expectation of the occurrence of such a process, because it would involve a reversal of evolutionary procedure. However, assuming the necessary synchronism,

the synthesis would appear possible. Then chemists would be able to individualize their atoms! We have noticed some suggestions by a physicist, in anticipation of the individual identification of molecules; but, so far as we are aware, no scientist has been sufficiently daring to suggest the possibility of individual discrimination with respect to atoms.

#### *Résumé of Chapter VII.*

The atomic theory. Atomic weights. Numerical sequence in combination of elements. Chemical atoms. "Ids." Nations. Analogy. Neither physics nor chemistry accounts for the properties of atoms. Inorganic elements combine numerically, as do nervous, sonorous and luminous mediums. We can no more compel a string to "perceive" harmony in an unequal division of its parts than we can compel a mathematician to believe that twice two is five. Chemical compounds. The "brain" of Oxygen responds, within its limits, exactly as does the brain of the mathematician or musician. Argument against



the self-evolution of atoms. The mechanical evolutionary hypothesis controverted. The "creation" according to theologians. The ultra-materialists in a *cul-de-sac*. An absolute mass-ether impossible. Primordial atoms are not merely mechanical factors, but active agents with innate likes and dislikes. Proof. Objections met. Selective action of Calcium, Chlorine, Iodine, sonorous mediums. Cause of selection. Discord and accord between atomic rhythms. Conjugation of cells. Psychological processes of selection. Response complicated by the organism's harmonics. Chemical selection. In the human organism, the basic chemical process superseded by primary psychic selection. Extreme cases. Mind and matter-environments contending. Origin of all response. The mere fact of combination of constituents radically affects the character of response. Nitrogen and Oxygen. Heat absorption. Free ether-points. Complexity of protoplasmic molecules. Synthesis of the elements of protoplasm—when possible.

## CHAPTER VIII.

### PHYSIOLOGICAL RADIATION.

ALL normal cerebral action depends on the efficiency of peripheral conducting nerve-fibres. We have dealt with this point fully in "Against Dogma and Free-will and For Weismannism." One well-authenticated pathological instance described by Dr. Strümpell will serve here as illustration. A youth became devoid of all peripheral sensibility except that arising through one eye and one ear. By closing these avenues, the patient might, at any time, be rendered as inert as a log of wood; he could not respond to ether-rhythms. The reality of ethereal motions is apparent to common subjectivity. The undulatory theory of light arose from the discovery that, by adding, under certain conditions, light to light, we cause the effect of darkness. By similarly adding sound to sound we cause silence,

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and, by similarly adding liquid waves to others, we annul the abnormal motion. These effects are produced by what is called interference. Under the conditions, a rarefaction coinciding with a condensation, the waves counterbalance one another. Thus, the disturbance is nullified. According to our present hypothesis, the ether, immediately as well as mediately, is the excitant of all peripheral nervous response. The subjective products of such response are the issue of metabolism, which again is the result of complexity of atomic structure. Inorganic mediums manifest a certain metabolic capacity, but, as already explained, this differs from the metabolic capacity of biophoric structures, inasmuch as, in the case of inorganic systems, the ether can only mediately excite to motion beyond that innate to the system. A graphic representation of primitive nervous response (see page 127) shows that it is a series of wave-rhythms analogous to those propagated through air by a tuning-fork. The pitch of a musical sound depends on the velocity of molecular vibration in the medium. Similarly, the "pitch" of nervous vibration

depends on such velocity. Romanes found that at 25° Fahr. the number of a medusa's contractions per minute was 24; at 45°, 40; at 75°, 60. Heat applied to gaseous molecules involves similar variations of "pitch." As already stated, the most perfect concord involves the ratio 1:2 between the vibratory velocities. Other concordant combinations involve the ratios 2:3; 4:5; 5:6. Certain combinations involve ratios causing interference. This, again, causes what musicians call beats. These, within certain limits, affect the nervous system as dissonance. On our hypothesis, "dissonance" in the human brain (involving in its greatest intensity what we call insanity) is the product of nervous "beats."

In the case of vibratory action of inorganic matter-systems, the manifestation of vibratory energy has varying degrees of permanency dependent solely on the persistence of the extraneous stimulus. In metabolizing organic agents another effect ensues. This we call fatigue or exhaustion. No analogue to fatigue is manifested by inorganic systems; recuperative faculty is then absent, though, so long as their integrity

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persists, such systems will respond indefinitely to external stimuli. In organic systems we see a great difference. Though such a system will only respond to a certain persistence of extraneous excitation, it will recuperate its temporarily lost faculty. It manifests, in exhaustion and recuperation, two phenomena altogether different from the manifestations of inorganic systems. The higher we proceed in the scale of organism, the more marked we find such intermittence of reaction. Again, if we denude a primitive organism, say a medusa, of its most excitable parts (contained in the margin), we render the animal inert to normal stimulus. However, on the application of abnormal stimulation, say, by a Faradaic electric current, or a chemical irritant, we excite the mutilated tissue to a re-manifestation of rhythm. Now, it is well to mark that this abnormal manifestation will continue much longer than does the normal phenomenon of rhythmic response. Fatigue is less manifest, because we have taken away from the tissue its most complex nervous constituents and have thus caused it to approximate to an inorganic system. We may

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cause the mutilated, like the un mutilated, structure to inscribe its vibrations, which may continue for many hours, while the perfect animal would manifest fatigue after a few minutes' exertion. In my opinion, the phenomena of physiological exhaustion and recuperation are the two most conclusive facts demonstrating the delimitation of the inorganic from the organic, and offer a confirmation of my hypothesis that organic molecules originate in combinations of ether-points distinct from those involved in the constitution of inorganic atoms, and must, from primordial origin, have been differentiated from the latter. In the higher nervous organisms an effect analogous to the above may be produced by the mutilation of the cerebral structure. Then we may substitute, as in the case of the medusa, artificial for normal excitation. For details of experiments illustrating such reactions, we refer to "Against Dogma and Free-will and For Weismannism."

We must infer that the only difference between the highest and lowest nervous structures is in complexity of atomic constituents. This, and

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this only, accounts for the different responses of the medusa and the philosopher, or, as we may say, of the stone and the philosopher. Subjective states are mere incidental accompaniments of response affecting, according to its molecular constitution, each evolutionary product. Man's subjectivity is no more differentiated from that of the medusa than are the molecular constitutions of the most primitive and most recently evolved matter-systems. Scientists accept Prevost's theory of exchange of vibration between inorganic systems, but they are, at present, disinclined to extend this theory to what are called mental phenomena. Their position seems to me irrational in view of recently acquired experience. Virchow expresses my opinion in stating that what we call the laws of nature must vary according to our fresh experience. "What we call" the laws of nature are not necessarily all the laws of nature. That certain cerebral phenomena apparently contradict our experience is not sufficient reason for refusing to scrutinize the evidence on which these phenomena, so far as concerns human apprehension, rest. Either the

evidence for these phenomena is valid or invalid. If scientists can controvert it, let them do so. If not, let them adapt their theories to the phenomena. My belief is that experience does not controvert the particular phenomena, but that our interpretation of experience, if it leads us to scout the phenomena, is defective. My hypothesis, as will be evident to the reader, embraces all the phenomena of hypnosis, thought-transfer, "mind"-influence, as so many extensions of the radiant energy which physicists, as a matter-of-course, now attribute to inorganic systems. If we find that sound and heat may be transferred between matter-systems, why should we close our brains to the fact that other products are similarly transferred? Of course, certain conditions are necessary for the latter process of transfer; but so they are for the former. Granted that we cannot see or hear the thought. But neither can we touch or taste the sound and light. I would seriously ask whether we know all our perceptivities, whether the conventional limitations are not the outcome of ignorance regarding what we consider the best



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verified facts connected with our existence. Because we cannot see, hear, touch, taste, smell the form of radiation involved in ideation, are we to scout natural inference from what we have empirically verified, and from those common experiences that tell most of us that brain does dominate brain by sheer intensity of radiant energy? As well may a congenitally blind man deny the fact of light-radiation; a congenitally deaf man, that of sound-vibration. There is at present, no doubt, much quackery engaged in the exploitation of certain super-mechanical manifestations, but this once occurred in respect to other phenomena now thoroughly incorporated in scientific theory and practice. Some critics have taxed me for "materialism"; others may now reproach me for "spiritualism." My apology to these critics is that my hypotheses, whether "materialistic" or "spiritualistic," are the logical outcome of what my eyes and ears can apprehend. Under these circumstances, I am not deeply concerned to know what particular "ism" adopts me as a recruit. I have arrived at my "spiritualism," such as it is, not by the route usually

traversed. I have not taken a desperate leap to reach it. My "spiritualism" is a natural product of evolution. It has come to me as the inevitable corollary of my "materialism," and has been rendered apparent by objective and unemotional methods of scrutiny. To me, the evidence for the assumption of radiation of cerebral energy is as conclusive as that for radiation of any other form of molecular motivity. Merely because my ordinary sense-perceptivities do not, according to their several methods, render the sum-total of molecular nervous aggregation called "me" responsive in the conventional manners of seeing, touching, tasting, hearing, or smelling this or that phenomenal manifestation, instead of compelling me to deny the fact of the phenomenon, compels me, in respect to cerebral radiation, to deny that the conventional enumeration of sense-perceptivities is correct. Under the circumstances, I must revise my premises. I am not sufficiently obsequious to precedent to endeavour to twist fact to the particular bend of my prejudice. That way lies fallacy, and all I care for is truth. I am as distrustful of my "harmonics" as most

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other atomic aggregations are confiding with regard to theirs. Because the generality of scientists have not fully recognized the universality of evolution is, in my opinion, the reason why they reject, as outside phenomena, certain effects involving the transfer, between one and another matter-system, of radiant manifestations differing from those hitherto recognized as within the domains of physics, chemistry and physiology. On my hypothesis, only nervous matter is able to respond by metabolism to ethereal stimulus. It has been advanced by some investigators (notably the late Professor Romanes, whose elaborate researches on protoplasmic response to stimulation are classical) that rhythmic response by primitive nervous organisms is, to some extent, independent of nervous factors. This inference was derived from the fact that mutilated portions of such an organism, apparently devoid of nervous elements, would respond to stimulation analogously to un mutilated specimens. However, as Professor Horsley remarks, the evidence against nervous factors, in such experiments, is merely the fact that no nerves had been discovered in the

particular portion of tissue. Thus, the evidence is purely negative, and, in comparison with that in support of the hypothesis of invariable ganglionic action, insignificant.

Referring to my remarks on numerical sequence of response in the case of sonorous mediums and chemical combinations, I may here notice a remarkable analogous conclusion of Dr. Eimer with respect to a certain medusa. He found that, in mutilating the animal, the rhythmic response of each part was proportional to the part's numerical relation to the perfect structure. Thus, if he divided the animal into halves, each of these would respond by half the number of contractions normal to the intact structure. Again, if he divided each of these halves into equal portions, each of these would manifest one quarter of the original response. These researches, apparently, are not yet deemed conclusive; but, if Dr. Eimer's conclusions are established, they will offer a significant confirmation of my present hypothesis.

Like all vibratory action outside that normal to the molecules, nervous rhythm must be communicated by an outside factor. This is ultimately, on

our hypothesis, invariably the ether. The more impoverished is a structure with regard to nervous element, the nearer that structure will approximate to an inorganic system. Ultimately, we arrive at organisms whose biophoric constitution is so simple as to render them scarcely distinguishable from inorganic matter. There is no break in the chain of evolution. We find that vegetal and animal protoplasm, devoid so far as is known of nervous element, will react, by contraction, in response to various external stimuli, whether mechanical, electrical, thermal, or luminous. There is analogous response by inorganic matter: such is the behaviour of liquids and vapours under the stimulus of light or sound. What metabolism occurs in connection with protozoic or vegetal response must be considered as analogous to that of inorganic matter. We have already discussed the difference between inorganic and nervous metabolism.

To obtain artificial rhythmic response from primitive nervous structures it is necessary that the stimulus should be of such intensity as that normally affecting the organism. If the stimulus

is too intense, tetanus, instead of rhythm, is excited. This is analogous to the behaviour of inorganic systems. For instance, we could not obtain rhythmic motion from the india-rubber tube (see page 130) unless our hand conveyed a properly tempered impulse. Again, that artificial stimulus should ensure nervous rhythm, it is necessary that the excitant shocks should follow each other at regular intervals. The production of musical tones involves analogous conditions: if the impulses do not succeed one another at regular intervals, the issue is noise. This causes nervous spasm instead of rhythm.

In the higher organisms, the blood-corpuscles may be considered identical with the protozoa, and the actions of both are analogous to those of chemical molecules. The leucocytes or white blood-corpuscles, so soon as inflammatory action occurs in any part of the organism, vacate the blood-vessels and aggregate at the point of irritation, liquifying the diseased tissue into matter, or pus. Again, it has been recently discovered that if micro-organisms—disease-germs—attack the organism, the leucocytes apparently attack

them. All such manifestations are strictly analogous to the "selection" of chemical molecules. Similar illustrations are afforded by the behaviour of various bacteria and microbes in response to particular luminous radiations; of embryonic fungi in approaching nutritious matter at some distance; and of visceral molecules in causing the function of digestion. In such protoplasmic activities, we see the germ of what ultimately becomes the highest cerebral efficiency of the human organism. We can trace through all its grades, the evolution of the most complex nervous system, from such beginnings. But, because we can thus trace origins, does not involve the assumption that one undifferentiated evolutionary factor has energized throughout time. I have tried to show that, so soon as adequate complexity became innate to nervous systems, so soon did they respond directly to the ether, with the consequence that, in the case of the highest cerebral products, this response is now the principal evolutionary factor which changes the type, the effect being produced on the human unit through the collective organism: society.

The mind-environment, not the matter-environment is now the principal factor in fashioning humanity.

As in the case of the medusa, we can start artificial rhythm in the highest cerebral molecules. Much evidence is available to prove that these responses involve subjective states of isolated parts of the brain. It may be reasonably inferred that, could we isolate each nervous ramification, we should, corollarily, be able to isolate each response possible to the organism. We should then isolate each fundamental "tone" and its "harmonics" involved in the collective cerebral action. Could we, similarly, eliminate any nervous ramification, we might determine what "tones" and "harmonics" should be experienced by the organism. Then, society would be able to render effective its own whims, with a result, we venture to affirm, which would be the reverse of satisfactory, inasmuch as society would probably emulate certain disciplinarians by developing into a collective "crank" composed of dead-level mediocrities! It has been proved by Professors Horsley and Gotch that nerve-centres rhythmically discharge



energy. We have already discussed the application of this fact to our own hypothesis. This nervous "discharge" of energy is, on our hypothesis, the equivalent of what physicists call radiation. The cells and fibres of such nerve-centres are, on our assumption, complex integrations of biophors, distinct from all other cells, to which latter they convey stimuli. We have shown how the various substrata, on our hypothesis, derive rhythmic impulse from the cerebral system. Moreover, not only do organic substrata receive vibratory impulse from the brain, but brain transmits to brain such impulse, the issue being that some brains, through superior intensity of rhythmic discharge, dominate others. I find, *a priori*, no more difficulty in assimilating this assumption, than in assimilating the physiological verification that a muscle is influenced by a ganglion. If comparatively gross somatic elements can respond to a nervous impulse, I am prone to grant the probability that one brain responds to another. If nervous energy can permeate a muscle, I see no reason to deny that it may permeate another nervous system. Of course, in

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the same organism, it traverses various grades of the same matter-system. But, if it can do this, why should it not permeate the ether and be conveyed between matter-systems as are thermal and luminous radiations? There is nothing more conclusive to my apprehension than the evidence establishing the fact that certain brains dominate others. The fact is as fully demonstration to me, as that I must breathe to live. Again, if one brain can dominate another, what reasonable explanation of the fact is available, but that which attributes the same radiative function to a thinking as to an incandescent system? In what consists the essential difference between the "radiation" and the "discharge"? We can measure the amount of the "radiation," but not of the "discharge." But we can measure the velocity of the "discharge," as we can that of the "radiation." On the other hand, we can no more measure the velocity of the "radiation" by the method we employ in measuring the velocity of the "discharge," than we can measure the amount of the "discharge" by the method we employ in measuring that of the "radiation." The analogies between sound-

emission, radiant energy, electrical and nervous discharge, are so complete that only conventionalism of thought prevents our accepting such phenomena as special manifestations of one and the same responsive function of matter, differing in degrees, but not in essence. I venture to assert that the greatest future scientific development will depend on synthesis of the conventionally separated branches of research, and that no such synthesis will be possible until physicists, physiologists, psychologists, chemists, aim at synthesis as their main object.

According to the latest kinetic theory of gaseous expansion, the molecular motions are assumed to be linear or direct, instead of rhythmical. According to the current theory of nervous discharge, the nervous molecules are supposed to vibrate rhythmically, through alternate exhaustion and replenishment of function, such manifestations being the result of rhythmical periods of nutrition and devitalization. This is analogous to the alternate expansion and contraction of a gas or vapour in response to an intermittent beam of light. This action

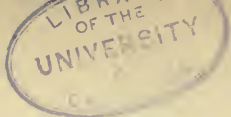
produces sonorous pulses, and, when sufficiently rapid, musical sound. On our hypothesis, the above manifestations of gaseous and nervous molecules are equally rhythmical and arise from hereditary endowment, as already explained. With our present knowledge of hereditary phenomena, this seems the rational view. At any rate, it satisfactorily accounts for the origin of motion in conformity with a principle energizing throughout organic evolution, while, on the current hypothesis, we neither account for the motions of the gaseous nor nervous molecules: all we do is to start assumptions with the existence of motion. As "radiant," "emissive," and "discharging" manifestations are equally rhythmical, I see no reason why all molecular motions issuing in such manifestations should not be considered rhythmical. If we accept periodic nutrition and devitalization as the cause of nervous rhythm, we are still dealing merely with words, unless we accept a super-mechanical origin. Such periodic nutritive phenomena may be the cause of nervous rhythm, but what causes the nutritive phenomena? Why

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should nerve-molecules invariably respond to nutriment by conveying stimuli at the rate of 33 metres a second? Unless we attribute hereditary rhythm to the molecules, I maintain that the "nutriment" theory explains nothing. According to our hypothesis, any excitation of molecules, whether organic or inorganic, involves merely an extension of hereditary rhythm, and the complexity of nervous response issues from the multiplicity of rhythms embodied in the system. Professor Wedenski, of St. Petersburg, has recently propounded that nerve-endings accumulate extraneous excitation and thus cause rhythmic motions in the organism. This is a support of my hypothesis. The phenomenon is quite analogous to that manifested by sonorous mediums which accumulate a number of consecutive excitations for the formation of sound-waves, and by those substances displaying phosphorescence and fluorescence. Whether we deal with luminous and thermal radiations, chemical combinations, sonorous undulations, nervous discharges, we are dealing with special mani-

festations of the cycle of rhythms permeating the universe and emanating from a First Cause.

Every phenomenal manifestation, for the first time truthfully interpreted, involves, on our hypothesis, a fresh manifestation of synchronism between cerebral and ethereal rhythm. Every mathematical equation showing the correlation of ascertained facts with more recently investigated phenomena, involves that the mathematician's brain synchronizes with the rhythm of the matter-system he is investigating: that is, that his brain assimilates and metabolizes into ideational product, those ethereal rhythms typical of the rhythms embodied in the molecules of the matter-system under investigation and, by them, inherited from the primordial ether. So often has mathematical and empirical synchronism between the human brain and the ether occurred that mathematicians are now able to forestall empirical investigators. Thus, Adams and Leverrier were enabled to foretell the localization of Neptune before telescopic observation had identified the planet. However, as already



explained, mathematics involves but a limited range of synchronous response. Outside that range, it is powerless to interpret phenomena. At the best, mathematics does little more than translate into abstract symbols a particular cycle of rhythmical manifestations. It tells us something about the properties, but nothing about the essence, of things. Observation by the sense-perceptivities involving empiricism and ideational metabolism, constitutes a wider range of synchronism and enables us to investigate a proportionately wider range of rhythmic manifestations. But, only ideational metabolism enables us to probe certain rhythms transcending the powers of sense-perceptivity. Physics can tell us something of how energy affects matter and how matter responds to energy. Of the objective natures of matter and energy, it can tell us nothing.

Subjectivity must inevitably condition every human verification, thus extending an impenetrable curtain between us and the essence of things; still, ideational metabolism affords us, with regard to matter and energy, relative truths.

which are entirely beyond the scope of any other organic response. These truths as much transcend in penetrative scope those of physics, as the latter transcend the superficial conclusions of sense-perceptivity uncontrolled by reason and relatively wide experience. However, as fully as the sciences owe their origin to the exercise of crude sense-perceptivity, so do these transcendent truths owe their manifestation to the concrete and abstract sciences. What sense-perceptivity and reason deny, science cannot establish. Similarly, what science denies, the higher ranges of cerebral response to ether cannot demonstrate as truth, that is, perfect synchronism between cerebral nerves and external phenomena. On the other hand, so long as the higher synchronism involves manifestations of cerebral rhythm clearly evolved from the lower-grade responses issuing in the conventional concrete and abstract sciences, we must accept the decisions of the former as equally demonstration with those of the latter. Thus, science tells us that luminous radiations constitute the product of cerebral metabolism called light. Science can



tell us a multitude of facts respecting this "radiation." Still, science, no more than ignorance, can tell us what this radiation *is*: it can only afford us an image the truthfulness of which we have no means of testing, except by the gratification it affords to the consensus of normal brains. Now, in metabolizing beyond physical science, we merely manifest an evolutionary growth of responsive function by extending our rhythmic scope. We derive from the verifications of science an analogously exalted standpoint to that derived by science from unenlightened empiricism. When we succeed in synchronizing further than the physicist, we attain conclusions which, while they are evolutionary developments from physical verifications, afford organic gratification involving a higher sensation of truth than that issuing from the ultimate verifications of physics. We seem more completely to divest things of their verbal shells. "Radiation," as our ultimate of "light" is, so far as regards the essence of things, really little more than the substitution of one word for another. Even when we have attained a rational conception of

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the possible form of this "radiation," its velocity, how it affects matter; even when we can confidently apply mathematics to its investigation, we are merely synchronizing with the rhythms constituting this "radiation" and metabolizing the issue into a necessarily satisfactory subjective impression. Inorganic matter-systems can synchronize with this "radiation" as effectively, within limits, as can human brains. The only difference between the two synchronisms is that the brains can assimilate and combine an infinite variety of "radiations," while the inorganic system can assimilate and combine but a few. A human brain once so synchronized as to formulate the Law of Gravitation; another, so as to formulate the Law of Multiple proportions; another, the Law of Gaseous Volumes. That these brains synchronized truly, is proved by the fact that the mind-environment has caused all other brains under its influence, to synchronize as did Newton, Dalton and Gay Lussac. The successive achievements of many such brains as theirs have now rendered possible another grade of synchronism: that involving the supermechanical

as a factor behind mechanical manifestations. This is the evolutionary issue of consecutive epochs of cerebral synchronism with the lower rhythms embraced within the physical sciences. As the intermittent beam of light causes gas to break into musical sound, so the intermittent efforts of various brains have now involved a fresh product of cerebral synchronism; a "fundamental tone" deeper than those "sounded" by physics, chemistry, and physiology. I surmise that all the phenomena of hypnosis and allied manifestations will ultimately be attributed to cerebral radiation, and, that the various assumed exciting causes, such as olfactory, gustatory, auditory, visual, electrical, tactile stimulations will be recognized as mere accidental adjuncts to the fundamental factor: cerebral domination through superior radiant energy exercised as what is called "suggestion." Given the necessary preponderance of radiant intensity in the operator's brain, and of concordant rhythm in that of the medium, I think we can rationally account for the effects. We can no more rationally exclude cerebral radiation, in consider-

ing such phenomena, than we can exclude luminous radiations in considering spectrum analysis. We hear of various operators who, by "passes," holding this or that object to the medium's eyes, ears, head, members, or trunk, ensure particular responses. On my hypothesis, the true cause is energetic radiant energy on the part of the operator, issuing in what we call "will-power," and, as it were, paralyzing all molecular rhythms in the medium's brain, except those synchronizing with the operator's. What is called self-hypnotism, will, in my opinion, prove to be merely the revivification in the medium's brain, through the phosphorescent faculty common to nervous and various inorganic systems, of the original stimulus. The exhaustion of the cerebral influx propounded by Braid and others as the cause of hypnosis seems analogous to my idea of temporary paralysis of certain nerve-centres. We have analogous instances of "paralysis" in various physical phenomena. Thus, by concentrating a noise on a candle-flame, we can cause it to nearly, or wholly, disappear: we can "paralyze" its vibratory energy. Of course, we

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can demonstrate that the effect is purely caused by the sound-wave, not by the puff of air. The candle-flame is a gaseous combination of incandescent Carbon and Hydrogen, the molecules of which respond to the sonorous rhythms as, on our hypothesis, do the nervous molecules of the hypnotized medium to the cerebral rhythms of the operator. Certain prepotent rhythms, in both phenomena, paralyze others. Of course I have not verified, by the ordinary methods, the existence of this cerebral radiation, but, I maintain that I have offered sufficient evidence to render the hypothesis rationally acceptable. We can only verify the existence of the ordinary forms of energy through sense-perceptivity and empirical investigation of their effects on matter. Well, in the case of cerebral radiation, sense-perceptivity and investigation of the effects of this radiation on matter likewise render the radiation apparent. Ordinary observation will convince any normally percipient man, through his eyes and ears, that one brain dominates another. Then, I maintain, no rational assumption is available to explain the cerebral

manifestation of dominance, except an assumption analogous to that which explains the extinction of an ordinary house-fire by sunlight. We can effect a cycle of all the forms of energy within the domains of chemistry and physics. Cerebral radiation is outside that category. Why? Because it has the same relation to biophors, that these have to chemical atoms. From the origin of evolution, these ethereal integrations have differed as have no others, and, there is the same difference between their responses to the ether. Cerebral energy involved a new rhythmic archetype just as did the biophor. All other forms of energy are merely variations of one and the same archetype distinct from the above. To me, it is no more demonstration that one muscular system, than that one cerebral system, is, under analogous conditions, able to overcome another. The only difference between the two cases, so far as concerns our apprehension of the conditions of conflict, is that our common sense-perceptivities can realize in the one case, but not in the other, the factors which determine the result. A human being is a

microcosm of a nation. In the man, as in the nation, multitudes of contending units struggle for predominance. We can realize what constitutes the predominance of a nation or a man in a conflict involving battalions, guns, and muscles. We cannot similarly measure the contending elements when the struggle is between one manifestation of molecular radiation and another. Could we perceive the minute as we perceive the gross, I surmise we should find that the former involves vastly greater issues than the latter. I venture to prognosticate that every year added to the life of humanity will render men more convinced that mind is destined to vanquish matter: that nervous radiation manifested as ideational products of synchronism with ethereal rhythm, must exterminate those products of synchronism permeating the organic substrata and issuing as visceral and muscular manifestations.

My estimate of the *pro* and *con* of Socialism (see my pamphlet) is mainly influenced by the conviction that the collective whole, society, will have to apply, under analogous conditions of opposition to the collective welfare, the same

restraint to the exercise of cerebral as to that of muscular efficiency ; that individual aggrandisement, when that involves the exercise of special capacities tending to the gratification of rapacity is as unmitigated a social evil as would be the unlicensed exercise of brute-passion and muscular efficiency. On the other hand, it is incumbent on society, and conformable with the theory of Socialism, that those products of cerebral efficiency should be fostered which, though they may tend to gratify the individual's selfishness, at the same time conduce to the welfare of his fellows. In other words : cerebral efficiency must be exercised by its possessor, not as property owned by "right," but as property of which the possessor is trustee under strict surveillance by the legatee : society. For some considerable period after the advent of Socialism, society will need to exercise the keenest scrutiny of its trustees ! Eventually, their main manifestation of selfishness will be the desire to earn the legatee's gratitude by efficient and honest administration of the estate. Then, the greed for gold will be supplanted by the greed for honour. We surmise



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that the new incentive will afford more gratification than did the old, both to legatee and trustees. We may state that, personally, we have no more reverence for honest efficiency than for honest inefficiency; but, *chacun à son goût!* We are aware that this is at present, and for some time will remain, too revolutionary a pronouncement to be practically assimilated by the majority. At present, socialistic doctrine is in rather an anomalous, and, to those inclined to cynicism, a ludicrous position. The "haves," not daring to betray fundamental motives, oppose the redistributive propaganda from ostensibly lofty principles of concern for society. To "pull off the gloves" and proclaim that they have only an academic interest in society or doctrines, but a vital concern for self, would be honest, but, under the circumstances, not politic. We all know what happens when honesty clashes with policy! By a converse logical procedure, the "have-nots," or rather their teachers, vehemently proclaim the brotherhood of mankind. These teachers, no doubt, often entertain honest and cultured conviction of the truth of their propositions. But

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what are we to say with regard to the motives of those who listen to these teachers? We may certainly credit the listeners with honest and uncultured conviction that, as they know and care little about the intrinsic merits of any doctrine, it is their duty to believe teachers who propound the iniquity of the "haves" and the necessity of depleting their pockets. It is a difficult matter to decide the exact shade of honesty (?) of the "have-nots."

The real motives of the "haves" and "have-nots" are as manifest to me as is sunlight. They are just the motives which impel me, only, in my case, a perverse idiosyncrasy compels me to prefer truth to "pocket." I am just as insatiable as is the gold-gourmand, only, a fortuitous concomitance of atoms differentiates my relish from his. Between us there is merely the difference of taste. "There's no accounting for" it! I am eccentrically selfish and I want to render what is now normal selfishness, eccentric.

I have been taxed with writing too trenchantly. My excuse is that a man who wants to urge his eccentricity on society must write trenchantly.

Men—at least the majority—do not act according to intellectual conviction. If they did, they would be mainly honest. He whose eccentricity is to win the day must thrust as well as argue. An effective thruster may beguile humanity into discarding idols. Hitherto, effective logicians have failed in that direction. I am trying to render the task easier to future logicians.

*Résumé of Chapter VIII.*

All normal cerebral action dependent on efficiency of peripheral conducting nerve-fibres. Pathological illustration. Origin of the undulatory theory of light. The ether, immediately as well as mediately, the excitant of nervous response. The metabolism of organic and inorganic systems compared. Pitch. Nervous "pitch." Dissonant and concordant combinations. Beats. Fatigue distinguishes the organic from inorganic. Artificial excitation of rhythm. Subjective states in relation to rhythmic response. Medusa. Prevost's theory applied to mental phenomena. Science and the assumption of cerebral radiation. Hypnosis, thought—transfer, "mind"-influence.

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Sense-perceptivity and cerebral radiation. Spiritualism. Materialism. Only nervous matter responds by metabolism to ethereal stimulus. Romanes on protoplasmic response. Horsley on invariable nervous action. Dr. Eimer on rhythmic response of medusa in numerical sequence. Vegetal and animal protoplasm devoid of nervous element. Response. Analogy from liquids and vapours. Protozoic and vegetal metabolism. Artificial rhythmic excitation. Analogy from sound and vibrating tube. Blood corpuscles. Leucocytes. Bacteria. Microbes. So soon as adequate complexity became innate to nervous systems, they responded directly to the ether. Mind and matter-environments. Response by isolated parts of the brain under artificial stimulation. Nerve-centres rhythmically discharge. Nervous discharge equivalent to radiation. Cerebral dominance. Response of one brain to another. Muscular response to nerve-excitation. Radiation compared with nervous discharge. Scientific synthesis. Kinetic theory of gaseous expansion. Rhythmical nervous nutrition and devitalization. Gaseous and nervous molecules

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vibrate rhythmically through hereditary endowment. Wedenski on nervous accumulation of excitation. Mathematical synchronism tells us nothing about the essence of things. Ideational metabolism a higher verifying factor. On what conditions it may be employed. How the synchronism of physicists renders available the application of ideational metabolism. Stimulation of the sense-organs in hypnotism. Suggestion the fundamental factor in hypnosis. Causation of hypnotic phenomena. Cerebral radiation outside the category of ordinary forms of energy. Why. Conflict between cerebral and muscular systems compared. Contending units in the individual as in the nation. Conflict between mind and matter. Socialism in relation to cerebral efficiency.

## CHAPTER IX.

### HYPNOTISM.

WHAT appears to me to vitiate all the investigation with which I am acquainted of hypnotic phenomena, is that the experimenters fail to record their own subjective states during the experiments they perform. On the subjective state of the operator, as fully as of the medium, depend, in my opinion, the effects manifested by the latter. In the case of each experiment, I should like to have an exact statement of the "mental" strain, if any, exerted by the operator; of the organic types he finds himself best able to control; of his own "mental" and physical temperament; whether his capacity for mental concentration manifests itself more strongly in one, than another direction. In my opinion, all the phenomena of hypnosis are, fundamentally, psychical, depending on ethereal transmission of rhythmic energy between the operator and the medium. This process of transmission involves.

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that certain rhythms issuing from the operator neutralize their analogues in the cortex of the medium, the result being that those rhythms normally transmitted from the medium's higher, to his lower, nervous strata are supplanted by a fresh series issuing from the operator. In the human type, even the lowest visceral functions are ultimately dependent on the efficiency of the central nervous organ; but, between one human organism and another, there is no essential difference in the character of the nervous stimuli transmitted from the brain to the viscera: the difference in visceral efficiency between one such organism and another depending merely on the intensity of nervous discharge and the responsive integrity of the non-nervous recipient structures. We may thus understand how alteration of character in the initial influx of stimulus ensuing from the substitution of the operator's rhythms for those normally permeating the nervous substrata of the medium, may cause great alteration (beneficial or injurious, according to the respective physiological conditions of the operator and medium) in the various organic

functions of the latter. We may, on the above hypothesis, account even for anatomical and physiological changes such as those vouched for by Jendrássik, Krafft-Ebing, Bourru, Buret, Berjon, Mabile, Ramadier, Voisin and others. These observers vouch for the following as effects of hypnotism: blisters (Beaunis, a French physician, photographed one such blister, and many other medical men have vouched for the normal appearance of the eruption), local increase of temperature, epistaxis, blood-sweat, the effect of burns on the skin. Some of the above manifestations are stated to have been produced by auto-suggestion, that is, by the "volition" of the medium, on his own person. The stigmata of the Roman Catholic Church offer illustration of such effects. No doubt the explanation of most of the ecstatic visions and prophecies transmitted by religious tradition, is to be found in auto-hypnosis. However, this auto-suggestion must, itself, on our hypothesis, originate from anterior extraneous suggestion, thus being a manifestation of the nervous phosphorescence to which we have previously adverted. Analogous effects occur



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when an hypnotized medium performs certain actions after a lapse of time determined by the operator. Thus, Richet writes: "When B—— was hypnotized, I said to her: 'You will come here on a given day and at a given hour.' When she awoke she had forgotten these words, and she asked when I wished to see her again. I said: 'Whenever you can come; any day next week.' 'At what o'clock?' 'Whenever you please.' (It will be understood from the foregoing that, during the hypnosis, the medium was informed of the particular hour and days on which she was to come; but that, on awaking, she was given to understand that the visits were to be at her convenience. Nevertheless, as will be seen from the context, she unconsciously carried out the directions conveyed during hypnosis.) She came regularly, with surprising punctuality, at the date and time indicated by the suggestion. This phenomenon sometimes led to absurd consequences. A—— (another medium) arrived one day at the hour agreed upon during hypnotism, and the first thing she said was: 'I do not know why I came. The weather is horrible, and I had

visitors. I had to run to get here in time, and I cannot stay. I must go back in a few moments. It is absurd, since I do not understand why I came. Is this another phenomenon of magnetism? ' ' "

One significant circumstance attending all such manifestations is that the medium cannot be aroused, after the sleep, to anticipate through association of ideas, the action-period determined by the operator. Thus, a medium who, during the hypnotic sleep, was told that on the following afternoon at 5 o'clock, he would read page 8 of a book (see Beaumis, *Le Somnambulisme provoqué*) had, on awaking from the hypnotic sleep, the book presented to him open at the particular page. No excitation moved him to read. The operator's suggestion was only realized as an impulse, at the stipulated time, in mechanical conformity with its terms, yet, when thus realized, the issue of suggestion was transformed by the "consciousness" of the medium, into an apparently (to himself) purely volitional act. What, under these circumstances, becomes of that metaphysical product: the "inner consciousness"

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which tells us we are "free agents"? Can we, as rational beings, longer tolerate this delusion of subjectivity? To those who desire a complete answer to this question, I recommend the perusal of my work: "Against Dogma and Free-will and For Weismannism." In regard to one specific action, we see in the above manifestations an absolute substitution of a strange subjectivity, for that normal to the organism. How far this process of alienation may be carried is an open question. I see no reason, given the necessary conditions of adequate radiative efficiency on the one side, and responsive assimilation on the other, why there should be a limit to its possibilities. In fact, on my hypothesis, it is an analogous process of alienation which causes the majority of men to conform to a certain drift of thought and conduct which I have, in my earlier work, defined as "social expediency." Men are hypnotized collectively as well as individually. We all rigidly or desultorily, according to our responsive capacities, obey the mind-environment, and each of us, with a few exceptions, flatters himself, just as does the conventional "medium," that what

he does is the product of his "volition." What we shall respond to, in other words, what we shall do and how we shall think are determined by our hereditary capacity for response to social environment. This latter is determined by the mind-environment. Social environment conditions, so far as hereditary endowment permits, the thoughts and actions of the individual. By manifestations of rhythmic response, perfectly analogous to those displayed in the ordinary phenomena of hypnosis, the normal individual, as fully as society, becomes the dupe of his own subjectivity. Society imagines that it fashions its own destiny; the individual similarly imagines he fashions his. The latter is the hypnotized slave of society; while society is the hypnotized slave of the mind-environment. That, during hypnosis, the "medium" is usually partially divested of his responsive faculty does not essentially differentiate him from the ordinary man who is hypnotized by society while "wide-awake." It is well known that, in the case of ordinary hypnosis during sleep, after one or more manifestations, the medium becomes susceptible

without precedent sleep. How soon this increased susceptibility may occur is purely a matter of physiological idiosyncrasy. The conditions are analogous with respect to the hypnotism of the individual by society. Though society has been hypnotizing all of us, from the cradle onwards, some organisms are innately more recalcitrant than others. Among these refractory organisms are some we call subversive geniuses: revolutionary innovators. Society tries, often successfully, to exterminate such types. Sometimes the task is too difficult. Then the obnoxious type exterminates society, or rather, some towering idol which society has been accustomed to worship. In such a case, the refractory organism is utilized by the mind-environment to impose on society a transition from one, to another, hypnotic stage. When this transitional process is accomplished, society is hypnotized into a new condition of slavery to the mind-environment: another evolutionary stage is reached on the way to definite, coherent heterogeneity. In all cases of hypnosis, it is essential, at the first experiment, that the

medium shall be a co-operating party : he must concentrate his "mind" on facilitating the operator's object. For this reason, it is impossible to hypnotize a person whose mental faculty is so feeble as to preclude the exercise of sufficiently continuous thought ; hence, hypnosis is unattainable in the case of lunatics. Moreover, we find certain, conventionally assumed, sane persons unable to submit to hypnotism by society. These types are represented by the criminal fraternity. The essential distinction between the criminal and certain other refractory types, say the revolutionist instanced above, is that the criminal type is a product of the matter-environment, striving mainly for sensual gratification ; while the revolutionary idealist is a product of the mind-environment and indifferent to sensual gratification—at least, he is not refractory with sensual gratification as his object. The type now illustrated by the burglar and garotter was once essential to social evolution. The reckless freebooter being now eliminated as a factor in social evolution, yet, the organic predisposition surviving in the burglar and footpad

types, these now pay the penalty for having outlived their evolutionary "fitness." Like certain emotional products of tradition, they must submit to the condition that what is useless as an evolutionary product, is baneful, and what is baneful must be exterminated. Though the altered environment promised by Socialism will, no doubt, largely eliminate the incentive to criminality, there will probably, for many ages, exist a criminal residuum hereditarily disabled from submitting to hypnotism by society. Society will, no doubt, learn to deal with this type from the pathological, rather than from the ethical point of view; still the type will ever suffer for its organic divergence from the normal.

After frequent subjection to an operator, the consent of the medium is not necessary to ensure the effect of hypnotism. Certain routes for rhythmic ingress then become permanently open. This is a constant nervous effect of use. We see manifestations of it in the various acquisitions performed at first with difficulty, afterwards, without conscious effort. Again, we see analogous effects in non-organic mediums. As an

instance, we may adduce the case of a violin, the wood-molecules of which, at first refractory, become readily responsive, after frequent use of the instrument, to the string's vibrations. Again, we see the effect in the various observances, shibboleths, creeds, which owe their persistence merely to mechanical responses rendered permanent by tutelage. Mainly through what may be called their grooviness of mental action, men are rendered incapable of accommodating their actions to their intellectual convictions. Through rendering difficult the practical realization of intellectual conviction, this mental grooviness tends to turn men into hypocrites. The only rational test of honesty is, that intellectual conviction governs conduct. When this occurs generally, the main part of what we call evil will be eliminated. As certain spurious emotionalism bred of tradition is directly opposed to all practical manifestation of intellectual conviction, it behoves those who venerate honesty to spare no effort to exterminate this emotionalism. If men will be honestly credulous, they must be ignorant. It is becoming more and more difficult



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to be ignorant. Corollarily, it is becoming more and more difficult to be honestly credulous. The consequence of the attempts now commonly made to reconcile ostensible credulity with actual scepticism is that society is becoming corroded by hypocrisy. Men must practically scout their credulity, or society must become rotten to the core.

It will now be instructive to devote a little consideration to hypnotic hallucination. First, let us premise that, from our point of view, the conventional distinction between hallucination and illusion is erroneous. According to this distinction, hallucination is supposed to be the product of brain-function acting independently of sense-perceptivity; while illusion simply involves the misinterpretation of a sense-perception. Thus, if an impressionable woman mistakes a piece of calico hanging from a clothes-line for a "ghost," that is illusion. It is hallucination, if, without any apparent sense-excitation, she so vividly conjures up the image of a dead child as to believe she beholds the "flesh and blood" reality. Pathologists may be correct in diagnosing cerebral disease according to such distinction.

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Psychologists who make the distinction are creating unnecessary difficulties for themselves. In view of the latest physiological verifications concerning brain-function, it may be affirmed that every subjective impression, whether "illusion," "hallucination," normal sense-perceptivity, or the highest ideational product has external origin, all brain-function being proved to depend on extraneous excitation of the peripheral nervous system. (See Dr. Strümpell's experiment referred to on page 214.) We cannot absolutely demonstrate that any two human organisms derive an identical mental sensation from any excitation. All we can do is, under certain conditions, to assume, without scientific proof, an identical subjective response. For instance, I do not *know* how any other man responds to the sensation I call "white." When he describes in words his own impression and produces what appears to me a "white" object, to illustrate his description, I still have no absolute demonstration that his sense of the words he employs and his subjective sensation of the colour are identical with mine. Granted that we both

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point to the same object as "white" and seem to agree respecting the words, there is nothing to demonstrate that one of us does not realize *in sensation*, from the object, while calling it white, what another realizes from an object while calling it blue. The application of optical tests does not invalidate this proposition, which, we may say, applies throughout the range of human experience. We have no absolute demonstration of the identity of response between any two brains to any excitation. Even when we consider such a fundamental experience as pain, showing a particular structural lesion and various reflexes as common to any two organisms in whom the same stimulus excites pain, we have only the demonstration of problematical analogy to show identical sensation. We do not *know* that a sensation equivalent to pain for one organism is identical with that affording pain to another. The instability of nervous elements and individual differences in conformation involve that the *reality behind words*, with regard to sensation, is only experienced by each individual for himself. The further we depart from such basic experiences as

“pleasure” and “pain,” the more purely inferential becomes our conclusion of identity in any two individual responses to the same stimulus. In the practical concerns of life, we have to ignore such considerations as the above, otherwise all ratiocination would be futile; nevertheless, in our present investigation of hypnotic hallucination, we may find it serviceable to bear in mind the above fundamental facts.

Let us clearly understand that, what is hallucination to the majority, represents, to the individual who experiences it, reality. Further, let us bear in mind that, what the majority perceive, may involve defective, rather than effective, perceptivity, compared with that of an abnormal unit who perceives more than they. Thus the normal-sighted perceive six principal colours in the spectrum: red, orange, yellow, green, blue and violet. Newton saw seven, adding to this list, indigo, and most authors since his time give the number as seven. Newton perceived seven colours because he represented a very rare type having colour-perceptivity beyond the average. Now, if no other man had been proved to perceive

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seven colours, as did Newton, we should have no logical reason for denying that Newton experienced hallucination. Therefore, it behoves us not to be too eager to attribute to defective perceptivity in an abnormal unit, what is really attributable to defective perceptivity in the majority. Ardent Radicals may derive from the illustration some chastening reflections regarding the necessary wisdom of majorities !

Judging from the recorded experiments of a multitude of investigators, there would appear to be no limit, under suitable conditions, to the cerebral perturbations attainable by hypnotic suggestion. This may involve any hallucination, from the most trivial sense-misapprehension, to a total alienation of the medium's personality. For instance, a subject awakes, exclaiming: "I am made of glass, do not touch me," and becomes delirious as the result of the hallucination. Positive hypnotic hallucinations are those by which the subject sees or hears what does not objectively exist. Thus, a medium may be caused to imagine that he is in a cold bath: "goose-skin" and other characteristic subjective and objective

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conditions manifest themselves; or, that he smells an onion which he supposes he holds: watering of the eyes occurs; or, that he has a dish of oysters before him: he eats them with relish. Of course, in such experiments, the investigators may be assumed to take precautions against imposition, and so many experiments have now been performed by different operators, giving analogous results, that we have no rational cause to doubt the records. The above are instances of positive hallucination. Negative hallucination involves lack of perception of what does exist objectively. Thus, a medium is told he can only see the operator, a company being present. The medium, although answering questions from the company, can feel, but not see them: a negative hallucination of sight only. Positive or negative hallucinations of all the senses, or any one sense, may be caused. Part of an object—say, a person's head, or the leg of a table—may be rendered invisible; in fact, as already stated, there is no limit to the sense-illusion attainable.

Now we will recall to the reader's mind our

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earlier proposition that no two individuals can be demonstrated to derive identical subjective experience from the same stimulus, and, that verbal and concrete proofs of agreement between such individuals do not constitute proof of identity of sensations. Let us suppose the operator has impressed on the hypnotized medium that a black object is white. When the medium awakes, he, on our hypothesis, sees the black object normally, that is, he derives from it the customary cerebral sensation, but the verbal symbolism representing the abstraction "black" has been metabolized into the equivalent of "white." It is one of the commonest experiences to find that sufficiently emphatic declaration by "authority" will beguile the ordinary run of mortality into implicit faith in any proposition, rational or irrational. We need go no further for illustrations than the current theological "orthodoxy" and "Home Rule." Nine out of ten informed men have now intellectually cut themselves adrift from "orthodoxy," yet, analogously to the hypnotized medium who calls black, white, while perceiving it as black, these informed people, through

hypnotism by tutelage, realize the correct mental sensation with regard to "orthodoxy" while they act according to the fallacy of symbols. Again, how many men, but a few months ago, saw in "Home Rule" the one vital question of the day, who, a few months still further back, treated the doctrine as a ridiculous and dangerous innovation on national integrity? We will leave our readers to decide the number of patriots who performed these chameleon-evolutions under the stimulus of Mr. Gladstone's masterly hypnotism. Every dominant spirit, whether he be a Napoleon or a school-bully, exerts over his fellows an influence perfectly analogous to that of the hypnotist over the medium. In all such cases, the effect depends on radiant and responsive action, involving the imposition of specific rhythms by one matter-system on others.

Now, we will deal with another case of hypnotic hallucination. A medium imagines he holds an onion, and evinces all the customary signs of smelling it. Evidently he derives from the hallucination all the mental sensation he would derive from really smelling the onion. This



instance differs from the former, inasmuch as no concrete existence is involved in the hallucination: instead, we have a verbal "ghost" of such existence. On our hypothesis, we have no difficulty in understanding why this "ghost" is, under the conditions, just as efficacious as would be a real onion to excite the *sensation* of holding and smelling an onion. The sense-perceptivities usually conveying such an impression to the brain are here superseded by others. Instead of deriving the *sensation* of the onion through his eyes, nose and mouth, the medium derives it through his ears. The reason he can now obtain, through his ears, the *sensation*, is that his eyes, nose and mouth had previously impressed it on the medium's brain. The revived impression is a manifestation of memory issuing through the phosphorescent faculty inherent to nervous and some inorganic matter-systems, and to which we have already adverted. It is now immaterial, so far as regards *sensation*, whether the medium derives the experience through his ears or through the normal channels. The anticipation of a meal causes the hungry man's mouth "to water," through an analogous manifes-

tation of phosphorescence. To feel hungry means that certain parts of the brain are in a state of hyper-excitation: their responsive function has been stimulated by the visceral substrata. The hypnotist has similarly stimulated the responsive faculty of the medium's brain. Consequently, the medium is ready to derive from the hypnotic suggestion a sensation analogous to that derived by the hungry man from the anticipation of a meal. Moreover, when the hypnotist provides the medium with mental gratification of an analogue of ordinary hunger, there issues the exact parallel, so far as regards *sensation*, of providing a meal for the hungry man.

The whole range of hypnotic phenomena involves merely displacement of certain channels of rhythmic influx. Because certain excitations impress us differently according to whether they are conveyed by hearing, sight, taste, smell, or touch, does not involve that those excitations are themselves essentially different. It merely involves that the central organ recognizes the channel of influx. In hypnosis, we cause a certain central organ, the brain, to receive directly from the

operator an impression already elaborated by *his* brain beyond the stage of peripheral influx. If, for instance, the medium is told that, on awaking, he will hear certain non-existent sounds, his sense-organs do not convey the false impression, but certain parts of his brain, without co-operation of his auditory channels, accept directly from the operator the consequences of a normal auditory stimulation. Then, through memory, the process of cerebral metabolism proceeds as though certain preliminary normal stages had not been omitted from the series. We may compare the effect to that issuing from the administration of a peptic food preparation to the stomach. In the case of hypnotism, as in that of the modified digestive function, the respective organs are enabled to dispense with certain preliminary metabolism: the cerebral, like the visceral pabulum, is elaborated before it reaches the central organ. The main significance of peripheral nervous excitation, so far as concerns the highest nervous structures, arises *after* the mere sense-impression has vanished: the mere sensation, say, of vision is, of itself, insignificant as a factor in collective nervous

response. Before the organism can manifest such energy as is involved in the intelligent application of sight, the memory of many anterior visual impressions must react on the latest stimulus. Congenitally blind people, or those blind from infancy, who, as adults, gain vision, are, at first, utterly unable to recognize any object, by sight. There are abundant instances on record to prove this. Only gradually, through the co-ordination by cerebral phosphorescence, of the various newly acquired sense-experiences, does the patient learn to normally utilize his eyes. This applies throughout mental experience. Only through tutelage and exercise does the civilized man, in certain respects, surpass the savage; while, in other respects involving various sense-perceptivities, through the lack of such factors, the civilized is inferior to the uncivilized man. (Of course we are here dealing with the individual. Practice and tutelage affect the *development* of hereditary capacity in the individual, but they do not *alter* the hereditary capacity; nor does the individual, by exercise of his own faculties, affect those of his posterity. The type is only affected by heredity

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and selection under the mind and matter-environments, as already explained.)

Let us now examine another case of hallucination. A medium is hypnotically rendered blind to the presence of certain people. Here we have a converse phenomenon to the last. Then the medium perceived as sensation something which did not objectively exist. Now, he fails to perceive as sensation (bear in mind the qualifying word) objects which do exist before him. We must again draw the reader's attention to our earlier proposition respecting the futility of pretending to measure sensation by the analogy of apparently identical symbols and concrete examples. We do not even know what sensations our own brains can perceive. The reason is that many such sensations are never metabolized by the cortex beyond the stage of the particular visual impressions with which we are now concerned. We are, with respect to such sensations, in the same position as is the hypnotized medium to those visual stimuli which he fails to mentally perceive. We see similar instances of unconscious sense-perceptivity when experimenters produce,

in narcotized or cerebrally mutilated animals, by means of electrical stimulation of certain brain-areas, the sense-perceptivities of hearing, seeing, &c. In such cases, though the senses respond, the correlated brain-areas normally concerned in metabolizing the initial excitation, are inert. Again, physiologists prove that numerous impulses must be conveyed by the viscera and other parts, to the brain, which never issue as conscious excitation. Thus, so far as concerns the collective entity: the organism, there is unconscious as well as conscious sensation. In our present example, the medium's visual apparatus reacts in the customary manner: he does experience a visual stimulation from the presence of those individuals he fails to recognize; but, in place of the intellectual image, normally following sense-stimulus, his brain memorizes an intellectual image impressed by the hypnotist. Consequently, though his visual apparatus reacts, the product of response is annulled by the counteracting suggestion. Thus, the metabolism essential to intellectual application of the sense-excitation, is prevented, and the medium becomes, so far as concerns the particular

excitation, in the position of the congenitally blind person, at the moment he gains his sight. The totality of our reasoning amounts to this : by superior radiant energy, the hypnotist's suggestion is enabled to anticipate as cortical stimulus and thus to annul, as cortical excitation, all sense-impulses opposed to that suggestion. This again involves that the suggestion, by its radiant energy, has "photographed" on the cortex a more vivid picture, than that issuing from a normal sense-excitation. So soon as the particular sense-image denied by the suggestion reaches the cortex, the "memory" or "photograph" of the suggestion, prevents the metabolism of the image into conscious perception: the cortex having been directly impressed with a certain picture, through direct ethereal transmission, "selects" that picture when an opposing image reaches it from the sense-organs. Whenever this occurs, metabolism, instead of starting from the sense-image, starts from the suggestion, with the consequence that the medium is, at once, sensually aware and intellectually ignorant of the presence of those objects he is commanded not to see.

A psychological law, first formulated by Dugald Stewart and since developed by more modern investigators, propounds that every mental image involves a momentary intellectual acceptance of the truth of that image. Thus, as Taine remarks: "On looking suddenly down a precipice, we imagine ourselves to be suddenly thrown head-long to the bottom, and this imagination only terrifies us, because, for an imperceptible moment of time, it is a belief. We instinctively draw back, as if we felt ourselves falling." Now, I believe that the law of Dugald Stewart does not explain such a phenomenon as that instanced by Taine. For, in the majority of cases involving a sudden glimpse of a precipice, there is a tendency to leap to the bottom, and, on my hypothesis, it is not the belief that he will tumble down the chasm that appals the spectator, but the fear that he will yield to the impulse to throw himself over the brink. This impulse is readily explicable. Every sense-image, in the process of ensuing cerebral metabolism, undergoes progressive analyses, not necessarily conscious, by successive applications to it of precedent memories. The



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collective issue of this process is, to the individual according to his intellectual endowment, a rational ideational interpretation of the particular sense-impression. The reason why lunatics do not attain an average of rational interpretation is that, with them, the process of checking the sense-impression by memory is too limited, with the consequence that the initial impulse governs the collective metabolic issue. To a person who experiences the sensation of fear, under the above circumstances, the first issue incident to the visual impression derived from standing on the brink of the precipice, is the impulse to move along the line of least resistance: in this case, space. As Mr. Herbert Spencer tells us, this tendency is a manifestation common throughout nature, and we might adduce, as no doubt might the reader, many concrete illustrations of the fact. However, with regard to the human brain, the statement must be modified. Only the most primitive manifestation of impulse tells a human being to jump down a precipice. One by one, in inconceivably rapid succession, a number of later evolved memories tell that being not to take the

leap. Nevertheless, the more ancient an hereditary tendency, the greater is its vitality. In many such predicaments as that under consideration, the primordial impulse to move along the line of least resistance tends to overcome later evolved memories. We see numerous illustrations in everyday life of this fact. All the selfish non-chalance and indulgence characteristic of a large part of humanity proceeds from ineffective cerebral opposition to the primordial tendency to move along the line of least resistance. The man on the precipice, finding opposition to the primitive tendency painful, by the exercise of another primitive impulse, that of self-preservation, rather than by the exercise of memory, turns away from the brink. On the other hand, in rare cases, the impulse to self-preservation proves less powerful than the other. Then, the individual leaps through space. Many cases of apparent suicide, are really as purely beyond control by the collective entity, as would be his death through an accidental gunshot. In such a case as the above, all depends on the prepotency of one hereditary impulse over another: a momentary victory of

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the impulse to move along the line of least resistance, and, over the brink goes the victim. Now, there is another cerebral type which, circumstanced as in our illustration, would entertain no sensation of fear, however profound the chasm down which he gazed. (It may be necessary to point that we are now dealing with innate function, unmodified by practice which, of course, in the individual, vastly augments the manifestation of innate capacity. Thus, a "steeple-jack" can execute manœuvres, through constant exercise of normal faculty, utterly beyond the powers, say, of a clerk, though both may possess identical innate faculty.) In this second type, we can as readily explain the absence of "fear," as, in the other, we explained its existence. We are now dealing with an organic type in which that other primordial impulse, the impulse to live, is stronger as a motor than the impulse to move along the line of least resistance. This type feels no inclination to explore abysmal depths by the aid of gravitation. In some individual instances, so much more strongly is the representative of this type governed

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by the impulse to live than by that to move along the line of least resistance, that the individual can execute a number of fantastic evolutions on the top of a church-spire as readily as inside the bar-parlour of the adjacent public-house which, after his ecclesiastical achievements, he will probably patronize! It may occur to some that the man who thus risks his neck on the top of a church steeple cannot experience a very strong impulse to live. We will now show how a man may undertake the most foolhardy enterprise and still experience the impulse to live as fully as his fellows. Such a man has two reasons for not declining the enterprise: either he is unable to appreciate the risk, or he does appreciate the difficulties, yet estimates his own powers as adequate for overcoming them. In the first case, his memory (cerebral phosphorescence) is innately, or through lack of exercise, defective. In the second case, his metabolic application of memory is, according to whether he fails or succeeds in the enterprise, defective or efficient. It will be seen that the "impulse to live" is quite independent of the ratiocinative process which influences a

man in any particular enterprise. This impulse, like those "to move along the line of least resistance," to drink when we are thirsty, to stagger from a heavy blow, is, so far as concerns normal brains, an hereditary product of nerve-energy, quite distinct from the metabolic action issuing from memory, as ratiocination. Thus, from this standpoint, Taine's interpretation of his illustrative example is fallacious. We do not "imagine ourselves to be suddenly thrown headlong to the bottom" of a precipice, but, on the conditions, we feel that we must throw ourselves to the bottom. Then, the opposing impulse to live nullifies the other impulse, and "we instinctively draw back." The impulse to live and that to follow the line of least resistance are really what physiologists call reflex actions, analogous to that which causes the eyelid to close automatically when a speck of dust approaches the eye. Two able investigators of hypnotic phenomena (Binet and Féré) have adduced Taine's example to illustrate the genesis of hypnotic hallucination. They assume the example to represent the "germ" of a hallucination, inferring

from it that, in every man, there are similar "germs" awaiting development by suitable conditions. From our point of view, it will be seen, that there is no connection between the manifestation in question and hallucination; that we may as well infer such genesis from the fact that men blink their eyes in response to a sudden luminous shock, as from the facts that they feel inclined to leap down a precipice through the impulse to follow the line of least resistance; and decline the leap, through a counteracting impulse: the impulse to live. It may be advisable to observe that this "impulse to live," in the present connection, must not be confounded with any ratiocinative process involving inferences from the effects of concussion, &c., on the human frame. The impulse is purely "instinctive," entirely independent of memorizing collation. It is a nervous function common to all organic products, vegetal and animal, and probably an evolutionary derivative from the impulse to follow the line of least resistance, from which, however, in the higher organisms, it is quite distinct.

When a mouse tries to escape a cat, there is no

ratiocinative process involved. The mouse does not infer that the cat will do this or that, any more than the man on the precipice argues with himself about the effects of concussion in drawing away from the brink. The mouse, like the man, merely manifests the primordial impulse to live. Why the mouse should act as though the impulse to live were unrealizable near the cat, but realizable near a cheese, is susceptible of an analogous solution to that which explains why a certain person did not like "Dr. Fell." Rhythmic repulsion is the cause of the mouse's action as fully as of the unaccountable antipathies we all feel for certain of our fellows. In my opinion, rhythmic affinity and repulsion will ultimately be accepted by scientists as the fundamental factors in all organic and inorganic phenomena. We do not know whether the cat, like ourselves, has learnt to use symbols to "echo" to himself and convey to other cats the particular images issuing from his cerebral response to ethereal rhythm. We do not know this, any more than we know whether the vibrating molecules in the wood of a violin have a *lingua franca* enabling them to similarly



communicate. Nevertheless, we are compelled to assume that these wood-molecules, like our and the cat's nerve-molecules can improve, by practice, their responsive efficiency. We will now, to emphasize the above proposition respecting rhythmic response, revert to our earlier proposition regarding idiosyncrasy. Every pure abstraction and every concrete perception symbolized by an abstraction involves an image peculiar to the one organism, but not necessarily common to it and any other individual. Verbal symbols do not enable one organism to perfectly "reflect" the subjective states either of itself or of another organism. If they did thus accurately reflect, they would be useless as symbols, because no man's symbols would then be comprehensible to another man. The very fact that they do not reflect accurately, ensures their utility as symbols. Each symbol merely resolves an infinite series of subjective states into a collective image. A final subjective state involving this intellectual transmutation of precedent subjective states into an arbitrary formula is thus different in each organism. Consequently, the same verbal sym-



bols represent for each organism a different collective whole issuing from different parts: in other words, the same verbal symbols represent different subjective states, and, consequently, have different "meanings," for each individual. Thus, words are merely arbitrary "shadows" which, while we assume them to represent reality, represent only a possible approximation to an "echo" of reality, which approximation is interpreted in a manner peculiar to himself by every single human organism. Words are thus "ghosts" of "ghosts."

A. and B. call india rubber elastic. On the other hand, A. has no objective proof that B. does not *feel* india rubber as A. *feels* a stone. A. really does no more than guess at a certain problematical fact with regard to B. Again, though A. pictorially delineates a horse and points one out to B., there is no absolute demonstration that, what A. seems to B. to depict as a horse, is not really apprehended by A., as B. apprehends a dog. This may appear an extravagant statement, but it is strictly conformable with the latest scientific verification regarding subjectivity. We

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have really no warrant in assuming that any two structures so inconceivably complicated as are two human brains, realize any two identical stimuli in an identical manner. In fact, all demonstration points the other way. If every cerebral impression is but an image of some objective reality; then, unless the molecular structure of two brains is identical, there can be no identity in regard to their images. Again, that a (to human perceptivity) infinitely minute difference between two cerebral structures should cause an infinite difference in collective subjective response, would seem undeniable in view of the instability of nervous elements. Therefore, we may rationally infer such infinite difference between the responses of all cerebral structures.

Against the above propositions several plausible objections may be advanced. For instance, it may be asked, with the deprecatory chuckle so much affected by superficiality, how could one man conceive a horse as another conceives a dog? Let them try to get the horse into the dog's kennel to prove the absurdity of the proposition! Now, this plausible objection simply amounts to

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a gratuitous assumption of the very facts in question. It assumes as proved what we must rationally consider disproved: that subjective impressions are not merely images of, but objective realities themselves. The question is not whether a horse can enter a dog's kennel, but whether one man's subjective pictures of a horse, a dog and a kennel, are another man's pictures, and whether any man's subjective impressions of the objective realities are those realities instead of their appearance to one particular man. Though we apply optical tests according to the laws of reflection, refraction and diffraction to solving the difficulty, we advance no nearer a solution, because we are dealing with subjective metabolism entirely outside the range of physical laws. Physiology, though it could trace the so-called function of every nerve-fibre and cell in the human organism, will, for ever, remain utterly powerless to discover truth regarding the most rudimentary subjective impression. To attain such truth, we must pass the mechanics of evolution, and physiology can merely deal with the mechanics.

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Now, if every man transmutes, as above explained, every verbal "token" in a manner peculiar to himself, it will be understood that, given the state of hypnotic subjection to superior radiant energy, any verbal token may cause normal sensation, in connection with a concrete object, to the medium, while, at the same time, he appears to respond as though it caused alienated sensation. Thus, the hypnotist's words, while apparently causing sensational hallucination, are merely accepted by the medium as altered *tokens* of sensations which remain normal. So far as regards his *sensation*, it does not matter to the medium whether the token for what he experiences as "black" is the customary word, or some other, say, "blue." If we only bear in mind the pure conventionality of all our *definitions* of subjective states, we shall facilitate the examination of a whole system of normal and abnormal psychical manifestations now obscured by the current confusion of symbols with sensations. We must clearly understand that words represent but the crudest approximation—if even that—to a *wide average* of subjectivity; that every

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man construes not only objective realities, but the verbal symbols supposed to represent these realities, in a manner peculiar to himself. Language is Algebra applied to sensation.

When we remember that every normally excited muscular contraction, even though it be what is conventionally termed a reflex action, is fundamentally a psychical phenomenon, inasmuch as it is effected through nervous response to ethereal stimuli, we may readily account for all muscular manifestations arising in hypnosis. For instance, by suggestion we may establish many forms of paralysis, altered peristaltic action issuing in purging, nausea, vomiting, &c. Now let us examine such phenomena. How nervous energy is transmitted so as to cause muscular action will probably never be adequately explained by humanity. We may say the same with regard to the effects of energy on inorganic matter-systems. All we can do is to argue from the fact that we perceive the particular manifestation as an effect of matter's response to energy. I have already afforded the reader my own hypothesis with respect to the origin of energy and matter

and how they mutually energize. This explanation being conveyed in verbal tokens, of course conveys no *sensational* experience of the effects. To derive such *sensational* experience, men would need to supersede their normal machinery: reason would need to be supplanted by intuition. We all know that, at present, intuition is "under a cloud."

In hypnotically exciting the above muscular effects, we utilize the same radiant prepotency as ensures any other hallucination: we supersede a series of progressive normal excitations, by one excitation elaborated by the hypnotist. We offered as an analogy to this process of substitution, the effect of peptonized food on the digestive function. We may here emphasize an important fact in connection with hypnosis: the medium must always be able to form, in conformity with symbolic conventionalism as already explained, a subjective picture of what is expected by the hypnotist. If these conditions are not satisfied, or imperfectly satisfied, the response is either non-existent, or proportionately defective. For instance, if the medium has not been educated

into conventionally interpreting a cerebral image from, or, in familiar language, does not know the meaning of, the words "black," "paralysis," "purge," no effort of the hypnotist can cause any response to the words if used in suggestion. As this proposition applies universally to hypnotic phenomena, it proves that psychical action is the basis of every hypnotic manifestation. Some investigators think that various forms of hypnosis are excitable independently of psychical action. I surmise that these investigators have not used sufficient precautions to eliminate the psychical factor. A strong confirmation of my hypothesis of invariable psychical action in all forms of hypnosis is afforded by the behaviour of mediums in respect to suggestion opposing firmly ingrafted ideas. Thus, as Moll recounts: "Suggestions are made with success to a devout Catholic, but directly the suggestion conflicts with his creed it will not be accepted. . . . A subject will frequently decline a suggestion that will make him appear ridiculous. A woman whom I easily put into cataleptic postures, and who made suggested movements, could not be

induced to put out her tongue at the spectators." By intensifying the suggestion through accessory external stimulus, it is sometimes possible to nullify the effect of memory, thus compelling the medium to perform the repugnant suggestion. Thus, Moll relates: "It is suggested to Mr. X. to say 'fool' to one of the persons present, directly the clock strikes. X. does not do it; the idea occurs to him when the clock strikes, but he declines to carry it out. But, if instead of the striking of the clock, I choose some other more lasting stimulus which keeps the idea alive, I attain the desired result. For instance, the suggestion succeeds if I say to the subject, 'You will say fool to that man when you wake and see me rub my hands.' When X. wakes I rub my hands, and the idea arises in his mind; he represses it for some time successfully. However, I go on rubbing my hands for more than a minute; X.'s resistance becomes weaker and weaker, and finally the suggestion is executed." In the above instance, it is manifest that the medium derives the accustomed *sensation* from applying the word "fool" to another individual.



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His *sensation* is as true to custom, as is that of the man who calls "black," "white." Thus, there is even in supposed alteration of sense-perceptivity, only *apparent* change of sensation. In each case, the medium's brain, at the same moment, entertains sensational truth and symbolic fallacy. The radiant prepotency of the hypnotist "peptonizes" for the medium's brain a certain spurious impression, which the brain proceeds to "digest," just as, under analogous circumstances, does the stomach. It is scarcely needful to insist on the grave possibilities involved in this radiant prepotency of one human organism over another. A tremendous vista of vital consequences to society, as much as to the individual, must open to the meanest intelligence. During every waking moment of our lives, we are either "mediums" or "hypnotists." From the neurotic woman at the Salpêtrière, to the "hard-headed" man of the world, this nervous radiation dictates to humanity. How far nervous prepotency may be utilized to perturb the normal predisposition of the individual; how much "crime" is directly its consequence, or, on the other hand, how much criminal tendency it controls, who can decide?

The possibilities are absolutely incalculable. If no supreme dictator ruled the average of human action, it is quite evident to me that social evolution could not energize on its present lines: humanity could not tend to a definite, coherent heterogeneity. There can be no reasonable doubt that vulgar assumption "hits the mark" when it affirms that personal influence is the great factor in determining human conduct. On this account, I see, in the destruction of dogmatic theology, an all-important aim to those who seek to render personal influence conducive to honesty. So soon as we attain collective honesty, but not before, we shall realize what is now propounded as ethical Christianity. Without honesty, social brotherhood will ever remain an empty aspiration of the few, and a jingling catch-phrase of the many. I have, I hope, in this and other works, sufficiently emphasized the unalterable conditions imposed on the individual by heredity. On the other hand, so far as concerns the external manifestation of hereditary qualities, it would be puerile to deny the momentous consequences of man's influence on man. On this depends the psychological evolution of the type, and, by the mind-environment, the

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average of this influence is determined for humanity.

All "volitional" and "involuntary" muscular action is caused by what physiologists call nervous discharge. Various investigators have localized a number of areas in the brain and spinal cord as the originating centres of special muscular actions of the organs, limbs, members, blood-vessels and trunk. Through properly regulated nervous discharge we are enabled to preserve our normal upright position. Through defective discharge, involving muscular relaxation, the joints are not properly controlled. Thence ensues any stage of degeneration, from various forms of perturbed motion, to total bodily collapse. If certain nerve-roots are divided, all the corresponding muscles become flaccid; thence arise various paralyses. Muscular motions issue from the cerebral hemispheres and medulla. Special fibres, afferent and efferent, convey ingoing and outgoing stimuli to and from the hemispheres and medulla. Probably there are communicating fibres, the tracts of which are at present undiscovered, between the hemispheres and medulla, thus rendering the

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hemispheres the ultimate source of all muscular energy. All our knowledge amounts to but the barest apology for a real explanation of how energy causes matter to respond by motion. This applies to muscular, no more than to inorganic, or to the highest "intellectual," response. We can no more explain how heat causes gaseous expansion, than how nervous discharge causes a muscle to contract; the viscera to assimilate food, or the brain to metabolize ideas—all is equal mystery. We can merely exercise our faculties on such problems by taking as granted the fundamental facts and, inferring therefrom, according to empiricism. It is clear that the same nervous motivity which causes a man to mentally "feel" a "white" sensation, causes him to lift his hand. He will not lift his hand, unless he experiences a certain mental sensation, any more than he will "see" a "white" object unless he experiences another such sensation. Now, I have propounded that the *sensation* of "white" is entirely independent of the arbitrary symbol accepted by the brain: a man may transpose his *intellectual* perception of "white" into, say, "black," but he cannot similarly trans-

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pose his *sensational* perception. We have now to see how this applies to the hypnotic suggestion causing a medium to become paralyzed. All muscular motion, like all colour-perceptivity, proceeds from cerebral action. Now, if a person accepts a hypnotic stimulus to intellectually transpose "white" into "black" while *feeling* it as "white," he may vary the process, by accepting the hypnotic stimulus to intellectually transpose his ability into inability to move. Granted sufficient intensity of the hypnotic stimulus, there is no reason why the intellectual should not preponderate over the sensational factor, so as to cause a hallucination of the muscular sense, issuing in psychical paralysis, which is not very uncommon in hysterical patients. The medium would then lose the power of motion, not because of nervous degeneration, but through the prepotency of intellectual over sensorial stimulus. He would accept, by an analogous action to that involved in the colour-aberration, the hypnotist's "peptonized" excitation. In both cases, the intellectual, instead of the sensational impression, governs the outward manifestation; only, in the paralysis, there is an

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added effect: the intellectual prepotency producing also a genuine sensational illusion. In the colour-case, it will be remembered, there is intellectual *without* sensational illusion. During the paralysis, the medium would, so long as the perturbed intellectuality persisted, not only psychically "feel" the incapacity for motion, but his motor fibres also would accept the "delusion." Thus, though the effects would be analogous, in the paralysis the muscles would become, not merely apparently, but really inert. In fact, the same muscular inertness which occurs in the psychical paralysis also occurs in the accommodation-muscles of the eye during some forms of induced visual hallucination. Then the eye-muscles respond to the intellectually perverted visual-perception, as do the ordinary muscles in the induced paralysis. The reason why we cannot assume, in the case of sense-impressions, as in that of motor impulses, *sensational* aberration as an issue of hypnosis, that is: why the same process of transposition cannot occur in the induced paralysis as in the visual abnormality, is that sense-impressions, other than motor, are normally beyond control of the collective.

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entity, while the muscular actions, at any rate those conditioned by psychical paralysis, are normally within such control. Thus, we cannot "voluntarily," without closing the lids, prevent our eyes from seeing; but we can "voluntarily" cause our hand to rise: in other words, the peripheral stimulation issuing in sight is not normally susceptible of metabolism into blindness, while the peripheral stimulation issuing in motor capacity is susceptible of metabolism into motor incapacity. In the colour case, the medium retains a correct sensorial image, at the same time accepting a false intellectual image, while, in the paralysis, he accepts a false sensorial image as the consequence of a hypnotically-induced false intellectual image. In both cases, it will be seen that cerebral metabolism proceeds from intellectually imposed false pictures, instead of from normal sensorial images; but, that in the paralysis, the medium's "volitional" capacity is involved in the hallucination, while, in the false colour-picture, the "volitional" factor is eliminated. The above explanation will apply to all hallucinations involving perturbed muscular action, whether normal muscular energy be

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increased or diminished through the hallucination, and whether the muscular action involved be "volitional," "automatic," or "reflex": for instance, whether the muscular manifestation involves the raising of a hand, peristaltic action of the intestines, vaso-motor effects involving control of the blood-vessels, or the "unconscious" closing of an eyelid. If, as the result of hypnotic hallucination, any of the above normal "automatic" or "reflex" muscular actions were prevented, though we should not be dealing with a "volitional" factor parallel to that involved, say in the raising of a hand, still, as the perturbed "reflex" or "automatic" effect is ultimately dependent on cortical action, just as is the "voluntary" raising of the hand, whatever alters the normal balance between intellectual metabolism and sensorial perceptivity must affect the "reflex" and "automatic" as it affects the "voluntary." In fact, all distinctions between nervous manifestations issuing in muscular action are fundamentally arbitrary, the question not being one of essential difference, but merely of difference in the degree of cerebral metabolism



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involved in the particular manifestation. A strong confirmation of the rhythmic hypothesis propounded in this volume is afforded by the phenomenon of "*rapport*." In hypnotic *rapport*, the medium responds only to one person, the hypnotist, all others being ignored. Now, assuming that one person only had the ability to lead the medium from a normal to a hypnotized state; that, *after entering that state*, the medium should continue to respond only to the hypnotist is unaccountable unless we assume the rhythmic psychical factor to be as efficient during, as before, the hypnosis. In other words: during hypnosis we have "unconscious" selective action, just as we had in the sonorous effect of the sounded bugle referred to in an earlier chapter. Then, what constitutes the difference between the "psychic" energy in the two effects? Rhythmic synchronism is as manifest in the hypnotic as in the sonorous manifestation, and an "ego" is no more essential to the former than to the latter. Again, if there is the same selective "discrimination" exercised during an "unconscious" hypnotic as during a normal "conscious" state, and as by matter-

systems conventionally considered inert, then we must logically grant that the distinction between "conscious" and "unconscious" action is fundamentally false, and that rhythmic responses to vibrations conveyed through, or directly originating from, the ether, are really, each as the other, of the same character. Then the basis of all cerebral manifestations is response to ethereal vibration hereditarily developed into various metabolic products, as propounded in this volume.

#### *Résumé of Chapter IX.*

The subjective state of the hypnotist in relation to the phenomena of hypnosis. The method of hypnotism. Visceral function ultimately dependent on cerebral efficiency. Structural changes through hypnotism. Blisters, epistaxis, through suggestion. Stigmata. Deferred suggestion. Mechanical response to suggestion. The medium's illusion of "free-will." Possibilities of hypnotic suggestion. Men are normally under hypnotic influence. Mind-environment hypnotizes humanity. Types refractory to hypnotic sugges-

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tion. Co-operation of the medium essential at first to hypnotism. Why lunatics cannot be hypnotized. Criminals refractory with respect to hypnotism by society. The difference between the criminal and the revolutionary idealist. Criminal types once essential to social evolution. Socialism and such types. Analogy between hypnotism and the ordinary nervous effects of use. Shibboleths, creeds. Mental grooviness turns men into hypocrites. Spurious emotionalism. Honest and dishonest credulity. Hypnotic hallucination. Hallucination and illusion. All subjective states have external origin. No identical nervous response between organisms. Colour-hallucination. Analyses of subjective states. Sensation and symbols. Defective perceptivity of the majority mistaken for hallucination in the individual. Newton and spectrum colours. Wisdom of majorities. Possibilities of hypnotic suggestion. Objective symptoms in hypnotic hallucination. Positive and negative hallucinations. How a medium accepts "white" for "black." Illustrations of hypnotism by "authority"—"Home Rule," theological ortho-

doxy. Hypnotic influence in common life. Mr. Gladstone's hypnotic powers. How a medium imagines he holds and smells a non-existent onion. Analogous normal manifestation. Cerebral phosphorescence. All hypnotic phenomena involve displacement of certain channels of rhythmic influx. Excitations conveyed by the different sense-organs not essentially different. Hypnotic suggestion compared with the administration of peptonized food. Blind people and the recovery of vision. Inability to recognize objects on first recovering sight. Co-ordination of sense experiences by cerebral phosphorescence. Civilized man and savage, how one surpasses the other. The effect of practice and tutelage on hereditary capacity. How a person becomes hypnotically blind to the presence of others. Unconscious as well as conscious sensation. Anticipation by the hypnotist of normal cortical stimulus. The impulse to live and the impulse to follow the line of least resistance. Selfish nonchalance and indulgence proceed from the tendency to follow the line of least resistance. When a person will throw himself down a preci-

pice. Apparent suicide, accidental death. The type which has no fear of its incapacity to resist the impulse to follow the line of least resistance. Steeple-jack, only apparently irresponsive to the impulse to live. Reasons for undertaking foolhardy enterprise. Impulses to live, and move along the line of least resistance really reflex actions, involving no ratiocination from memory. Common to vegetal and animal organisms. Impulse to live probably evolved from impulse to follow the line of least resistance. Why a mouse tries to escape a cat. No ratiocinative process. Rhythmic repulsion and attraction. Personal likes and dislikes. Every mental image peculiar to one organism. Verbal symbols do not accurately reflect subjective states. If they did they would be useless as symbols. Why. The same symbols appeal differently to each individual. No absolute demonstration that what A. sees as a horse B. does not see as a dog. Proof. Objections. In hypnosis, sensations remain normal, while verbal tokens are altered. Conventionality of definitions. Words represent but the crudest approximation to a wide average of subjectivity.

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So far as regards his sensation, it does not matter to the medium what definitions of sense impressions are employed by the hypnotist. Conventionally considered reflex muscular action is fundamentally a psychical phenomenon. Hypnotic paralysis, vomiting, purging, &c. Nerve energy and muscular action. The medium must know the meaning of the hypnotist's directions. Connection of the fact with the assumption of invariable psychical action in hypnosis. Hypnotic suggestion opposing firmly ingrafted ideas. Illustrations. Analysis of the manifestations. Consequences to society of hypnotic possibilities. Crime and hypnotism. The psychical evolution of humanity by the mind-environment. Volitional and involuntary muscular action. Localization of cerebral areas. All our knowledge the barest apology for a real explanation how energy causes matter to respond by motion. Application to muscular, intellectual and inorganic response. Sensation and symbolism. Explanation of hypnotically-induced paralysis. How sense-impressions differ from motor impulses in respect to hypnotic response. All distinctions between

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nervous action resulting in muscular manifestation are fundamentally arbitrary. Confirmation of rhythmic hypothesis offered by hypnotic "*rapport*." Ego. Conscious and unconscious action. The basis of all cerebral manifestations.

## CHAPTER X.

### POST-MUNDANE EXISTENCE.

IT may be advisable before concluding this volume, to offer a few remarks on a subject which deeply concerns humanity. Do we men preserve our individualities beyond the grave? is a momentous question which, could science answer it for the present generation as effectually as tradition answered it for many precedent generations, would materially modify the actions of that large section of the community at present mainly anxious to make the best of this world without perturbing their calculations by disquieting problems with regard to the next. Could I reassure such people as to the existence of a future field for the manifestation of their individualities, I am convinced that, with the prudence which characterizes so much of their worldly activity, they would look out for eligible invest-



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ments in that future sphere, and, in doing so, would be less exacting with regard to "interest" than in their analogous worldly transactions. All these prudent people need to excite their speculative instincts is full assurance of the existence of a preter-mundane field which each must explore for himself, and there pay off the debit of his worldly account. It was, no doubt, good for humanity that, during many centuries of intellectual darkness, men were hypnotized into irrational expectation of a future state. Who can tell how like the beasts our Wilberforces, Peabodys and Spurgeons would have energized had not the mind-environment convinced them of the existence of this unexplored region? I do not believe that men are innately nearer the "angels" than they were any time within the last fifty-thousand years. In this nineteenth century, they are just as dependent on the mind-environment for all their excellences as they were in the first or will be in the fortieth century. Consequently, I feel that I should incompletely execute my task did I not try to re-invigorate that salutary, but at present sickly, belief in a future existence.

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On my hypothesis, every integration of ether-points involves an integration of certain ante-cosmic supermechanical potentialities. Further, every such integration preserves, so long as the system endures, all the rhythms determined for it by the primordial process of emanation. Then if the rhythmic combination characteristic of any particular matter-system be fixed, as I have tried to show it is fixed, as a product of emanation, in the supermechanical energy—whether that combination were immaterial or materialized would not affect its integrity as a correlation of potentialities. Accordingly, the persistence of the material form need not be essential to the persistence of the immaterial. If we grant the inevitability, which I have already tried to establish, of the immaterial, as the emanative basis of the material, we have no logical reason to deny that the immaterial emanative basis will endure longer than the material evolutionary superstructure. Matter being merely an incidental manifestation of energy, we must logically grant that energy will persist when matter is annihilated. Thus, if we have systems of energy

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integrated as matter-systems, we have no reason to assert that the former will not exist independently of the particular medium through which only our senses can comprehend them. Though the limitation of our faculties precludes our apprehending, in the common sensuous manner, systems of energy apart from their concrete conditions, it is absurd, in the face of what we already apprehend respecting energy, to refuse to follow our intellect when it drives us beyond the sensuous. So long as our rational *steps* to the super-sensuous process of verification are true evolutionary products arising, in close sequence, from sense-perceptivity, we need have no fear regarding the certainty of our logical process : we may then be assured that we emulate the sonorous or luminous medium by synchronizing with ethereal vibration, and that we then obtain an extension of the truth, of which such a medium realizes but a relatively insignificant part. In "Against Dogma and Free-will and For Weismannism," I have dealt with certain ethical and theological issues propounded by the adherents of tradition as incident to the

assumption of immaterial existence after physical death. To that volume I refer those readers who desire a full expression of my views on the above questions. I may here remark that, could I believe traditional doctrine to be practically conducive to honesty, I should be the last to attack that doctrine. However, as I perceive that collective honesty is the great desideratum for society, and that such honesty is inconsistent with the profession of exploded beliefs, I have done my best to rationally exterminate the "unfit" product. I am a unit of that army summoned by the mind-environment to inaugurate the application of new evolutionary machinery and to break up the tools discarded by nature.

If we men do preserve our individualities beyond the grave, we must certainly grant that all other products of evolution similarly preserve theirs: that their rhythmic energy as concrete systems persists as immaterial systems, just as does ours. Immateriality energizes in the stone, the tree and the worm, as it does in the human animal. If the immaterial system can outlive

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the concrete in man, it can so outlive it in all other integrations of supermechanical energy. How any concrete integration can preserve its individuality as immateriality we need not try to symbolize by words, because, as already shown, these are merely the crude approximation to a wide average of sensuous response, and the metaphysical product of such symbolism, however satisfactory it might be to the individual who originated it, would necessarily lack the conventionalism which enables us to arrive at a consensus of acceptance with regard to verbal representations of experiences less remote from our sense-perceptions. We should, were we to attempt such symbolism, lack the intermediate steps connecting it with mental images within our common apprehension as evolutionary products issuing from sense-perceptivity. But such considerations do not invalidate our inference from the fact of concrete, to that of immaterial, existence, any more than they would invalidate our inference from the fact of molecular nervous movement to that of consciousness as its consequent.

It may be urged: as the concrete matter-system remains after what we call death has occurred, and as that matter-system is, according to the hypothesis, an integration of ether-points which are, themselves, analogues of immaterial potentialities, this "dead" matter must still contain some of, if not all, the potentialities which constituted the "living" organism. Then, why should we consider the "life" which has left the matter any more representative of the original system than the matter remaining behind? Why are not the potentialities remaining in the matter, equally with those which have left it, representative of that particular system of energy which constituted the "living" organism? And if they are thus equally representative, how are we to conceive a reunion of those potentialities which have, presumably, reverted to the ether, or to supermechanical energy, with those still in the "dead" matter?

Though we cannot, for reasons stated above, pretend to explain how a system, at one time concrete, could preserve its individuality as an immaterial system, we may attempt to answer

the above questions. If we grant the rational establishment of the evolutionary hypothesis advanced in this work, we grant the integration in the germ-cell of the particular organism of a combination of potentialities preadumbrated for that organism, in the supermechanical ether, and, moreover, we have no logical reason to deny a reversion to that ether, of the particular combination. I believe that I have rationally established my hypothesis and that, consequently, the ultimate issues of that hypothesis, here propounded, are rationally acceptable. That the potentialities remaining in the "dead" matter are separated from others which have left that matter, is, on my hypothesis, as reconcilable with future reunion, as the existence in the ante-cosmic ether of the particular potentialities is reconcilable with their later integration as the particular germ-cell. Again, I have propounded that matter must be annihilated. Then, the ethereal integrations which constitute any particular matter-system must ultimately become free; what was preadumbrated as that system in supermechanical energy must revert to immaterial existence. Only

thus, as a transmutative process, can we interpret the annihilation.

In considering the question of persistence of individuality after the "death" of a concrete system, we must remember that the *real essence*, the innate potentialities which we call the soul or mind of each man, are merely subjectively, and consequently with merely relative accuracy, known even to the individual himself. To the rest of his fellows he is still more inscrutable. They can only judge his "inner self" by the conventional and, as already shown, inaccurate symbols by which men communicate, which symbols themselves, under the present social conditions, are rendered additionally delusive by the individual's efforts to utilize them to disguise even his own inexact perceptions of his "inner self." We have only to remember the different estimates which each man forms of another, to realize that what we can perceive of ourselves and others is as far removed from the "thing itself" as is any other picture formed by our perceptivities. Thus, if we cannot form an absolutely reliable picture of the concrete existence nearest to us, ourselves, it



is futile to attempt delineation with regard to existences transcending the concrete. All we can hope to accomplish is the establishment to rational acceptance of the fact of such immaterial existence. So much, I hope, I have achieved in this work.

In the above reference to the "inner self," "soul," "mind," I must guard myself against a possible false inference by the reader trained according to the conventionalities of theological doctrine. The "inner self," "soul," "mind," referred to above, is no "spiritual" entity akin to the "free *ego*" of metaphysics. It is a strictly evolutionary integration of potentialities governed by the same Law which controls all other matter-systems. I consider this "soul," "mind," "inner self" of man, from the same standpoint as that from which I contemplate analogous essentials in the medusa. That man has more potentialities correlated in his system than has the medusa, does not remove his "soul" from the same category of evolutionary products which embraces the "soul" of the medusa. That the one is, according to our subjective view, a higher manifestation of

emanative energy than the other, does not involve that such higher product has evolved itself into a factor uncontrolled by its Cause. To infer such independence would render ratiocination from experience utterly futile. Moreover, not only would such an assumption stultify the rational method, but, as I have already shown in "Against Dogma and Free-will and For Weismannism," it flatly contradicts the fundamental attribute with which theological tradition invests its anthropomorphic product of imagination. If we grant such independence, we import that fortuitous factor which I have shown to be irreconcilable with the order we perceive to control all phenomenal manifestations. As already shown, chance and evolution are radically opposed assumptions. In propounding "free-will," theologians tell us to accept chance. Their dictum will, here, affect rational men as does any other traditional product annihilated by scientific ratiocination.

To *know* this "soul," whether of ourselves or of the medusa, we must be able to objectively realize those potentialities of which that "soul" is, during the "life" of the organism, the material-

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ized, and, after "death," the immaterial correlation. As we cannot thus realize an analogous correlation—which I will call the "soul" of a lump of iron—as the potentialities, apart from their visible effects, of this infinitely simpler system are utterly beyond the range of our perceptivities, it is manifestly unprofitable to attempt to conceive the "soul" of the medusa or of the man. When we approach such questions, we near the boundaries which will ever mock human scrutiny, apart from that spurious emotional method to which we owe so much of the fallacy which has perturbed humanity. Whatever emotional pictures we may tickle ourselves with in regard to our "souls," we cannot retain rational procedure and attribute to the human "*ego*" more real freedom than we attribute to the "inner self" of the medusa: both are rigidly held by the evolutionary vice; both obey an inflexible governor. The "freedom" of "orthodox" metaphysics is strictly that of the inmate of a lunatic asylum who imagines himself king of England. Of course, this (as now manifest) emotional lunacy was once essential to social evolution, inasmuch as it constrained in the

direction of social expediency. However, the mind-environment having now discarded emotionalism and adopted rationalism as the machinery of evolution, whatever opposes reason opposes evolution and must consequently succumb. The goal for which society must now strive is honesty. This is only possible on the condition that society is loyal to reason.

In stating that the mind-environment has thus discarded one for another evolutionary factor, I am, of course, manifesting the subjectivity which impels every honest propagandist, and to which I have adverted in preceding chapters. Granted that no man *knows* that what he strives for is truth, still, he will, if he be an honest innovator, *believe* it truth, and belief only can, in these days, afford the propagandist an honest rational motive. Again, men can, in these days, only believe through rational evidence. Consequently, if they act against rational evidence, they do not act through belief, but through credulity, or some purely morbid motive. Now, the only means by which a man can honestly accept the guidance of credulity is through remaining honestly ignorant. But, in these days,

no average man can remain honestly ignorant: he must deliberately close his mind against evidence. Then, such a man is essentially dishonest: he is really a more formidable enemy of society than is the burglar. A thousand-fold more dishonest is such a man, if the evidence which he declines to confront, is that which demolishes the vocation by which he gains the sordid means of self-gratification, and, most dangerously of all, does a man offend the canons of honesty when his vocation involves the state-privileged public asseveration, as eternal truths, of demonstrated fallacies affecting the root of human conduct.

If an innovator states, as I have in this and preceding works, his grounds for belief, it is for those who doubt to examine his evidences, and, if they can, to controvert them. So far, I unhesitatingly assert, that the position I have adopted has passed virtually untouched, through a wide range of critical examination. From this fact, I judge that what I propound may have some measure of success in furthering the decree of the mind-environment. Against the above statement that the mind-environment has discarded the emotional

for the rational method, I am so satisfied that no rational disproof can be advanced, that I shall not trouble myself or the reader by offering demonstrations which every hour of his life must render more profuse to the observer furnished with those faculties and opportunities common to his fellows.

The statement that the mind-environment has adopted the rational in place of the emotional evolutionary method does not involve that emotionalism will cease to impel mankind. The gratification of the emotions, like that of reason, is a form of selfishness, and selfishness is the root-motive of humanity. Now so long as emotionalism does not prejudicially affect the collective honesty, it may be—we may even grant, it very often is—beneficial selfishness. The great distinction between rational and emotional selfishness is that the former works for honesty, while the latter frequently works for dishonesty. This is inevitably the case when emotionalism involves credulity as substitute for belief. On this account, the emotionalism of current “religion” is adverse to the best interests of society. Then, it involves national dishonesty as consequent. Some people

maintain that the highest conviction arises from emotionalism. These are the people who deliberately shun the possibility of testing their emotional "convictions" against the conviction issuing from reason. They are the people prone to "follow the line of least resistance": too selfishly indulgent to brace themselves by the still, cold atmosphere of what is, according to our most potent faculty, truth. When such people constitute a nation, that nation is rich in knaves: it is rotting through hypocrisy. The mind-environment is now striving to eliminate this type from human societies. Depend upon this: the mind-environment will attain its end. At one time, emotionalism had no rival. Then it could inspire honest conviction. Now it must confront and conquer reason, or render men dishonest. Emotionalism is inherently unable to cope with reason. It must accept reason as dominant ally, or quit the field. Every man who attempts to treat reason as his antagonist must privately acknowledge defeat: he must privately submit. Publicly, he may proclaim himself victor, and, in doing so, will act the knave. The man who picks your pocket is no more a

rogue than he who falsely proclaims himself the conqueror of his reason, and, as the conformation of the rogue, involves "unfit" cerebral development, inasmuch as it impels the man to run counter to the drift of evolution by opposing social expediency, then, only in degree, are the cerebral manifestations issuing in roguery differentiated from those issuing in imbecility, and, only in degree, is the repudiator of his highest faculty, the emotional "rogue," removed from the imbecile.

Moreover, if we estimate these degrees by the prejudicial effect on society of the respective manifestations, the procedure of the emotional "rogue" is a more intense manifestation of cerebral "unfitness" than is the eccentricity of the pickpocket, or lunatic. The latter affects society but superficially: the emotional "rogue" endangers the social foundations. Through the sanction of emotional "roguery," the dominant classes of most societies are to-day trying to oppose the mind-environment. If they prove too stubborn, the mind-environment will attain its end by social upheaval. Then society, instead of



gliding over the "cataract" intact, will be first rent asunder by the fires smouldering within its organism. It depends on the behaviour of those social units hitherto under the dominion of their emotions, whether the smouldering fires shall warm society into necessary metamorphoses, or rend it asunder. If these units stand by their emotionalism, evolution will need to re-cast from the *disjecta membra* of an extinct social organism. The mind-environment has now decided that the social organism shall dictate, more imperiously than ever before, to the human unit. So soon as men have cast off their emotional "roguery," they will recognize practically what the "fittest" among them now recognize theoretically: that man is the creature of his conformation and environment and that no man has intrinsic merit beyond another. The dangers incident to the realization of this truth by the "unfit" will be averted so soon as society removes sordid inducements to action by becoming the only owner. When a man best serves himself by best serving society, we shall need few goals.

Social ethics is summed up in the latest

biological and psychological verifications that man is the creature of his organism and environment and that, consequently, whatever he accomplishes is the product of factors over which he, as a personality, has no initiative control. Thus, the "rights" of the individual become the rights of society: the part must yield to the whole. As his own organs exist but as contributors to the well-being of the larger system of which they are parts, so the individual must energize with regard to society. His "rights," against society, are wrongs. He has no more right to monopolize against society the product of his faculties, than has his liver to "monopolize" against the rest of the organism, the product of its "faculties." When either monopoly occurs, the organism, whether society, man, or liver, suffers. Under the conditions of the matter-environment, the liver would suffer for its "monopoly": its own "life," and that of its "society," the human body, would be endangered. Under the conditions of the mind-environment, the monopoly of the individual man will, if it persist, inevitably endanger his and society's

existence. The liver, the man, and society, are systems, but, according to the mind-environment's decree, for only one of these systems: society, is it now expedient to exercise monopoly. Man, the individual, stands to the collective whole, society, as does any one of his own organs stand to the rest of the system. Society is at present exercising itself by desultory dallyings with this big question of individual "rights." Only a few among us have yet grasped the ultimate significance of such agitation as is now prevalent regarding the nationalization of land. Only a few among us recognize that land-nationalization is merely one phase of a vastly larger question which the mind-environment is about to settle. Only these few realize how near we are to faculty-nationalization. Probably many who now clamour for the smaller issue will hesitate when they realize whither their logical faculty and events must ultimately drive. These possessors of efficient faculty will inevitably realize with poignant interest that the possession of landed estate is no more an infringement of the rights of society than is the possession of any other product beyond the

creative scope of humanity, and that the individual's faculties come as fully under the category of accidents of birth as does his heirship to a dukedom.

So soon as we practically realize the fundamental biological and psychological facts recently revealed by science we shall not, if we are honest men—and this the mind-environment is trying to make us—trouble ourselves with nice distinctions as to what constitute indefeasible or defeasible proprietary "rights." Mr. Herbert Spencer's monumental researches on the question will then appear superfluous. We shall then realize that, whatever claims the individual may advance, his proprietary rights are mythical. The organism with which evolution is now mainly concerned is society. The mind-environment is now compelling us to be the tools, in a new fashion, of evolution. What we have to discover is what is best for society. Already the conviction has overcome us that a great number of proprietary "rights" are social wrongs. Depend upon this: we are destined to formulate a lengthy list of these anomalous "rights." So lengthy will this



list become that, I venture to prognosticate, we shall ultimately recognize no individualistic proprietary "rights" other than those catalogued as social wrongs. In the meantime, those honest folk who possess efficient faculty, but no land, will strenuously denounce the iniquity of our land-system, and will as strenuously try to blind themselves to the iniquity of our faculty-system. In fact, so soon as the logic of fact shows them whither they must advance, these efficient people will undoubtedly become members of Faculty Defence Leagues and run magazines to denounce those who would infringe the sacred "rights" of Faculty. Then editors will wax eloquent against those dastards who, belying the Englishman's proudest attribute (according to one of my critics), his honesty, try to undermine social foundations by applying to property in Faculty the same criteria of expediency as were once applied, with analogous nice discrimination, to property in land. These future editors will prove, as their brethren now fighting for "land" are proving, what a "will-o'-the-wisp" this "honesty" becomes when it is advocated from

the point of view of emotionalism instead of reason.

There is one economic doctrine, and one only, rationally reconcilable with current science. That doctrine is Socialistic. We cannot, in these days, logically evade Socialism; events will prevent our practically evading it. The "haves" who fight against it; the "have-nots" who clamour for it, exemplify the same motive: selfishness. The selfishness of the "have-nots" will, at last, be gratified; proprietorial "rights" are condemned by the mind-environment. "Grab" denounces "grip": one wrests, the other clings; each thinks he fashions his destiny. Only he who is neither "grab" nor "grip" sees what "pulls the strings." He only, perceives objectively the trend of evolution.

*Résumé of Chapter X.*

Post-mundane existence. Argument for the assumption. Systems of energy considered apart from their concrete conditions. Traditional theology and honesty. Honesty the great desideratum for society. If men preserve their individualities beyond the grave, all other products of evolution must preserve theirs. Immaterial preservation of individuality—why it cannot be verbally rendered intelligible. The potentialities which, at “death,” leave and remain in the organism—how they may ultimately re-unite. The annihilation of matter a transmutative process. The real essence of a man not known to himself. Soul. Mind. Inner self. Must not be confounded with the “free *ego*” of metaphysics. The soul an evolutionary product. The soul of man and of the medusa—how differing and how allied. Free-will—how theological tradition is irreconcilable with the assumption. The “soul” of a lump of iron. The “freedom” of orthodox metaphysics, that of a lunatic who imagines himself king of England. Emotional lunacy once

essential to social evolution. Honesty only possible on condition that society is loyal to reason. Belief. Credulity. The difficulty of being honestly ignorant. State-privileged public asseveration as eternal truths, of demonstrated fallacies affecting the root of human conduct. Gratification of reason and the emotions, forms of selfishness. Selfishness the root-motive of humanity. Rational and emotional selfishness—great distinction between. When emotionalism involves dishonesty. The emotionalism of current “religion.” The “conviction” issuing from emotionalism. The people who attain it. Emotional “rogues.” The imbecile and the emotional “rogue.” The emotional “rogue” manifests the most intense degree of cerebral “unfitness.” Emotional “roguery” endangers the social foundations. Social upheaval. The fires within the social organism. Man the creature of his conformation and environment. The dangers of the realization of this truth by the “unfit”—how averted. Social ethics summed up in the latest biological and psychological verifications. The “rights” of the individual and the



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rights of society. Mr. Spencer on defeasible and indefeasible proprietary "rights." Proprietary "rights," social wrongs: The only economic doctrine reconcilable with science. Socialism. The selfishness of the "haves" and "have-nots." The mind-environment is about to gratify the selfishness of the "have-nots." Those who perceive objectively the trend of evolution.

## CONCLUSION.

CHEMISTS tell us seriously that a cubic centimetre of air contains 21 trillions (21 followed by 18 ciphers) of molecules. Again, they tell us that a milligramme of hydrogen contains 144 trillions of molecules. If we now exercise our imaginations in trying to conceive the magnitude of an ether point, we may form a hazy notion of the difficulty which would be overcome by our hypothetical chemist who should succeed in combining the constituents of an elementary atom—itsself the fractional part of a molecule. But, it may be urged, are not such assumptions with regard to the divisibility of matter irrational? We reply: they are straightforward inferences from well-known laws and have been propounded by the leading mathematicians and physicists of the age. Besides, direct experiments amply confirm these theoretical deductions. Kirchoff and Bunsen prove that the three millionth part of a milligramme of sodium chloride will colour a gas-jet. Hofmann

proves that rosaniline colours 100 million times its weight of alcohol. Faraday prepared gold-films equal to one-hundredth part of the length of a light-wave. If such a film contained but one layer of molecules, these could not exceed the five millionth part of a millimetre. Tyndall found that a quantity of iodide of allyl which, multiplied by trillions, would not weigh a grain, was sufficient to form a cloud through which, from its own illumination, he could read printed matter. Under these circumstances it would be extremely irrational to reject any hypothesis on account of the infinitesimal dimensions involved. In fact, it is hopeless to attempt to grasp any fundamental propositions with regard to matter or energy, unless we are able to project ourselves beyond normal subjectivity. Our nervous molecules must so synchronize that the total effect on the organism may not only resemble the total effect of its molecular vibration on the tuning-fork or string; but, that, through metabolism, the nervous structure may, as it were, dissect from its collective response, an individual vibration.

On the other hand, there must be a limit to the

divisibility of matter. Thus, we are logically driven to assumptions beyond matter to account for its existence. We must logically affirm the existence of a supermechanical factor beyond matter, just as inevitably as we must logically affirm a limit to the divisibility of matter.

In the foregoing chapters, we have endeavoured to support by rational evidence, the hypotheses :

That matter is a property of energy.

That this energy is an emanation from a First Cause.

That an infinite universe is not the universe apparent to our perceptivities : this is finite.

That all the contents of this universe are mediums responding to, but not initiating, energy.

That, besides the conventionally accepted forms of radiant energy, there is another : cerebral radiation.

That rhythmic sympathy is the basis of all organic and inorganic response.

That the ether is the excitant, immediate or

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mediate, of all organic and inorganic response.

That a mind-environment, as well as a matter-environment, now controls the evolution of the most complex organisms.

That the mind-environment tends to destroy what the matter-environment tends to preserve.

That the ultimate issue of the conflict will be the transmutative annihilation of those products controlled by the matter environment.

## ERRATA

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- Page 20, line 7, *for ? insert .* (full stop)  
" 23, " 10, *for* physiological *read* physical  
" 70, " 13, *for* in *read* on  
" 79, " 7, *for* latter *read* former  
" 174, " 14, *for* into *read* in  
" 129, " 22, *for* rhythms *read* energy

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