"THE BIOGEN SERIES," No. 4

CAN MATTER THINK?

A PROBLEM IN PSYCHICS

"F. T. S."

1636

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ESTES & LAURIAT.

CAN MATTER THINK?

A PROBLEM IN PSYCHICS.

By "F. T. S."

EDITED,

With a Preface and Notes,

By PROFESSOR COUES.

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EDITOR'S PREFACE.

LONDON, 18 May, 1885.

Professor ELLIOTT COUES, M.D., etc., Washington, U. S. A.

DEAR SIR, — The accompanying MS. is submitted without reserve to your consideration and to any disposition you may choose to make of it, without disclosing its authorship. As it contains views not widely at variance from those to which you have given expression in "Biogen," possibly it may interest you to note the convergence of paths by which similar conclusions have been reached.

The recent organization of the London Society for Psychical Research must be regarded as a concession, on the part of science, to a pressure of spiritual environment that had become irresistible. Without exception, the enthusiasts who have made incursions upon the territory of "ghost-land" have hitherto sacrificed their scientific status and been ruthlessly consigned to the limbo of dupes and cranks.

But now a concerted movement is on foot. A detail from the scientific corps, *sang pur*, and volunteers invited, has been ordered to the front, armed, equipped, and granted a roving commission.

The public, the pseudo-scientists, the spiritualists, are boldly challenged to come on and show up the ghost of anything uncanny or even unscientific, and then stand off and see it demolished by scientific methods ; they ring the bell of the haunted house, and dare the spook to show himself. And you, too, have your "American Society for Psychical Research," staring telepathy in the face and ready to go over every inch of ground the Britishers have explored—and cleared of ghosts. Who is afraid now?

The psychical researchers have slipped their moorings and they are already adrift upon a boundless ocean. A gentle breeze, a psychic zephyr, a telepathic aura, is wafting them on to blue water. The hand-lines with which heretofore bottom has been everywhere touched, will soon be found too short, and deep-sea soundings become the order of the day. Will they ever fathom it, this abyssal bathos, and fetch up *Bathybius* alive? In some respects these explorers remind one of a crew of landsmen for the first time afloat. New experiences are to be encountered; unexpected emergencies are to be met and unforeseen dangers are to be avoided; novel methods are to be invented, unprecedented experiments are to be tried; and doubtless some most unconventional pilots are to be employed. A queer cruise this of theirs! Has the "Flying Dutchman" hove in sight at last?

In any event, this new departure marks an epoch that is destined to become memorable. It cannot be without result, if even inquiry be stimulated to such extent that no man need fear to tell what he knows, or to give the public the benefit of any conclusions at which he may have arrived.

I know that you watch the course of our respective Psychic Research Societies with the same keen interest and vigilance that we

do here. The question is, Are they putting to sea indeed? Thus far they have picked oakum to spin into theories, and walked the deck on tiptoe for fear of wetting their feet. I join your wish that we may not have to withdraw from a position that is becoming stultifying to every true spiritualist and every psychic scientist of experience.

Y'rs always,

F. T. S

THERE are several ways in which the human constitution may be regarded.

Every child discovers his body for himself, and believes he has a soul because his mother tells him so. This notion of the twofold, dual, or binary composition of the human fabric is one in which most persons live and die ; they know they have bodies, and suppose they have souls. "Soul and body" is a very useful term.

When persons think more about it, and enlarge upon the subject, proceeding from particulars to generals, they get a notion of mind and matter ; of that which thinks, and that which is thought about ; of the subjective and the objective ; of the ego and the not-ego ; and they polish off these two sides of Nature's one shield according to their respective ability and inclination.

Some persons after a while rub so hard on their own side of

the shield that they see their own reflection in it, as in a mirror. If they happen to be on the physical side, they forget about the other, and come to the conclusion they have no souls to speak of; if they happen to be on the psychical side, they are apt to conclude that bodies are not worth mentioning.

So the materialists and the spiritualists rattle and bang the shield, or play bo-peep with each other around its edges, according as they are pugnaciously or peacefully disposed.

There is another way of looking at oneself, which is in some respects an improvement on the foregoing. This way found probably its best expression in Greek philosophy and at the hands of Plato. According to this view of the human constitution a man consists of three things,—he is a trio, or a trinity; a spirit on one side, a body on the other, with something between which partakes of the nature of both, and so unites them in one. These three parts or principles are, on the one hand, *Nous*, the spiritual thinking principle, the reason or intelligence,—the mind, in short, such as man alone possesses of all created things; on the other hand, *Soma*, the body, like that of any mineral, vegetable, or animal; between them, *Psyche*, the irrational, instinctive, spiritual body or brute soul, such as any other animal possesses.

Numberless analogies of nature bear out this trinitarian way of thinking. Every “thing” we know, for example, has three

dimensions, — length, breadth, and thickness, without which it could not be “thingy,” or material, or objective and real. And in fact most things, either in physics or in metaphysics, that we can know about, have not only their two opposites, or extremes, but also some middle character, like both, but being exactly neither ; just as a stick consists in neither of its ends, but in its continuity, though it would not be a stick without both ends. So with male and female : a child is neither, though it becomes one or the other ; an aged person is neither, though it has been one or the other. So with love and hate, or hope and fear : there is a wide middle range of these affections between such extremes.

The fact that we are three-dimensional beings may have much to do with our trinitarian ideas. It is quite certain that we always invest even our deities with trinity : as witness Nara, Nari, and Viradj ; Osiris, Isis, and Horus ; Brahma, Vishnu, and Shiva ; Father, Son, and Holy Ghost.

But wherever we have a range of quality or character shading between two extremes it is obviously possible to make a scale, or gradation, and read off our marks as finely as we please ; just as one would graduate a thermometer. And it happens that *seven* is so almost instinctively applied by people in dividing things up, that one is tempted to suspect there must be a profound reason for it in the occult nature of things. A good deal

of time is measured in the septenary style, by seven, as the days in the week and sundry recognizable periods or stages in human life. The physicist counts seven colors of the solar spectrum, though all seven shade into one another, and common people see but three in the rainbow. Musicians and physicists alike reckon seven notes between each octave, and subdivide these again. Poets even give us "songs of seven;" some of the wisest philosophers have written books about nothing but the mystical properties of the number seven; and any old witch or wizard will talk to you mysteriously of seventh sons or daughters, and especially of their progeny in the seventh generation.

It is not likely that in the course of the world the human constitution could have been considered exempt from the "law of seven," and in fact the oldest and most lasting analysis of man that the world has seen is a septenary one. It is the Oriental, Hindu, Brahminical, Buddhistic, Theosophic, and what-not other way of looking at the human fabric. It will be so novel to most persons in this country, possesses such intrinsic interest, claims such profound meaning, and really does explain a man so intelligibly, that no apology is needed for dwelling upon it here, especially as it will throw much light on the very reserved author with whom we are going to deal. Here is the scheme; though I alone am responsible for everything in it except the Hindu names and their English equivalents.

The Sceptenary Analysis of the Human Constitution.¹

1. RUPA: <i>The Body</i> ; molecular matter; mass; form.	2. JIVA: <i>Vitality</i> ; "Life-principle;" od; aura; biogen; astral fluid; animal magnetism; non-molecular matter.	3. LINGA: <i>Astral Form</i> ; akasic body; a phantom; a shade; a shell; a ghost; a "spirit."	4. KAMA: <i>Animal Soul</i> ; instinct; passion; vehicle of will; body of desire; Paul's spiritual body; Plato's Psyche; the irrational soul.	5. MANAS: <i>Human Soul</i> ; consciousness; reason; volition and memory; Plato's Nous; human understanding, or the rational soul.	6. BUDDHI: <i>Spiritual Soul</i> ; "divine wisdom" in man; "Logos;" "Christ;" "Buddha."	7. ATMA: <i>The Spirit</i> ; "God;" "that which is," but is No-Thing."
Perishable; tend down. Objectivity. Phenomena.			Tends both ways.	Imperishable; tend up. Subjectivity. Noumena.		
Knowledge.				Faith.		
Psychic Science.						
Physiology.				Orthodox Religion.		
Phenomenal Spiritualism.			Philosophical Spiritualism.			
Systems of Science.			Religious Philosophy.			
Systems of Philosophy.						
Prophecy and Seership; Avatars; Saviors.						
Theosophy, Science of Sciences, and Philosophy of Religion.						

The plane of orthodox physical science.

¹ The Hindu names in the above table are not, all of them, those always employed. Thus, No. 2, *Jiva*, is also called Jivatma, and Prana. No. 3, *Linga*, is also called Lingasarira, or Lingha Sharira. No. 4, *Kama*, is

No one must fancy for a moment that these seven parts of man are in streaks or layers, like the leaves of a book, one "above" another; or yet that they are one "within" another, like a nest of pill-boxes. The differences between them are *in degree of materiality* from 1 to 7; or, what is the same thing, in *degree of spirituality* from 7 to 1. If we represent the idea of diminishing materiality from 1 to 7, it might be figured in thought as a cone, the broad base of which is Rupa, body or matter as the chemist knows it, and the apex of which touches Atma. Then, by a like figure, to bring into mind the idea of spirit infusing itself into and informing matter, in less and less degree "downward," spirituality would be represented by a cone reversed, its base uppermost and its apex touching Rupa. Further remarks upon this scheme may not be out of place, as

also called Kamarupa and Mayavirupa. No. 1 has also another name, *Sthulasarira*. But scarcely anybody in America knows Sanskrit; and almost any word is a mere symbol or sign of something. For those who desire to look into the system of Oriental psychics it will be very convenient to attach definite meanings to certain short and simple words, which may thus become working tools of thought for them. Of the seven names given in the table, four, — *Atma*, *Buddhi*, *Manas*, and *Rupa*, — are always used; and to clip the other three, so that the whole seven may be single words of two syllables each, will be a great practical convenience. It is therefore recommended that the seven names be committed to memory and definitely attached to the seven ideas they respectively represent.

they will tend to elucidate the meaning of the author of "Can Matter Think?"¹

¹ Swedenborg, before the mere scientist had lapsed in the visionary seer, gave the clearest explanation of the constitution of matter that I have seen in Western literature. His theory of "crustals" may be thus illustrated. Suppose a bag of bullets, making a mass. Suppose each bullet to be a ball of shot; that is, a spherical mass of spheres. Suppose each shot to be in turn a ball of smaller shot. Here we have in crude form the orthodox scientific notion of matter as consisting of mass, made up of molecules, and these made up of atoms. But Swedenborg went much farther; he did not stop short of mathematical points as his initial factors of matter, getting at "spirit" by this route.

Matter, as such, is admitted to be absolutely unknown to science except in *mass*. No scientist professes to have touched, tasted, smelled, heard, or seen a molecule even, much less an atom. He simply *assumes* both molecules and atoms. The molecule of any elementary substance is the simplest state in which it has the properties of that substance. For instance, a molecule of hydrogen, *as hydrogen*, consists of at least two atoms; but what these atoms would be like, separated from each other, he has no idea. In other words, if you could wreck the hydrogen molecule, hydrogen would cease to be itself.

The difference between ice, water, and steam is simply dependent upon the distance apart of the molecules of water, according to the degree of heat affecting their relative positions. "Heat" does this. Now, shock water with a finer force than heat, namely, with electricity, and you split the water-molecule into hydrogen and oxygen molecules. Chemistry stops here. But if a still finer and fiercer force could break up the hydrogen molecules, what would happen? The gas, hydrogen, would be knocked out of the phenomenal world; it would cease to be an "objective reality;" it would be biogen, perhaps, or od, or aura, or akasa;

Each of these seven parts of man is itself composite ; that is, has sundry parts or properties of its own, and each is divided systematically in the Eastern scheme. Thus, as every one knows, the body is compounded of various solids, fluids, and gases. Most of it is water, itself compounded of two gases, oxygen and hydrogen. Two gases, oxygen and nitrogen, are taken in at every breath ; watery vapor and carbonic dioxyd gas are given out at every breath. Most of the solid body is carbon in some form ; the bones are mostly lime, and there is mag-

but not an atom would be knocked out of existence ; it would simply be withdrawn from ordinary observation, and so could not be put in a bottle, or tied up in anything, or weighed, or done anything with on the physical plane.

Is there any force known which can disrupt molecules of matter ? *Yes, there is* ; and those who know it and can use it have no more difficulty in understanding and effecting de-materializations than they have in producing materializations from the akasa.

But to come to the point of this footnote. Apply the Swedenborgian illustration to the septenary constitution of man. Suppose every particle of Rupa—that is, every molecule of the physical body—to be a shot, size No. 1. But this shot is not solid ; it is composed of finer particles, Jiva, shot No. 2. Each particle of Jiva is similarly composed of particles of Linga, shot No. 3. And so on, with increasing fineness of particles, to the infinite sublimation of spirit. This illustration also helps us to grasp the ordinary Oriental definition of pure Atma as “the seventh principle of the seventh principle of matter.” The extraordinary subtlety of Eastern conceptions may be imagined if we remember that our own science has no practical knowledge of matter except in bulk. (See Appendix.)

nesia, soda, sulphur, iron, phosphorus, and so forth in the body. So also with the other numbers. Take No. 4, for example. The ethereal substance or essence of which Kama consists when in activity—that is, in motion—has the qualities or properties which we call passions and desires, and “emotions” of all sorts ; as hope, fear, love, hate, anger, pity, and all our many instinctive or intuitive attractions and repulsions, the operation of which is mostly set down by orthodox physiology to “unconscious cerebration,” or even to “reflex action.” The compound or manifold nature of each of the other principles is likewise evident, even of Atma itself, the peculiar properties of which are commonly called “attributes of God ;” though, more justly, the only attribute to be predicated of pure spirit, aside from its manifestation in mind or matter, is its unknowableness, — its no-thingness.

Again, each one of these principles, from Nos. 2 to 6 inclusive, is the connection, bond, or link between two others. Thus, Jiva, or vitality, keeps a man alive by uniting his ghost to his body. When Jiva is broken or dissipated, a man literally “gives up the ghost ;” that is to say, his body is separated from the rest of him, and he may consist then of Nos. 3 to 7. Dead and bodiless to the world and ceased to exist on the physical plane, as he is, he has nevertheless a substantial ghost, an essential soul, and as much of the other qualities as he has succeeded in developing

at the time his physical body is withdrawn from him by the loss of its vitality. Thus also the Linga, or astral form, is that part of man which unites his animal soul, or "spiritual body," with his vitality, and so with his physical body. We might also illustrate the idea by reference to the other principles of human constitution ; but the reader will readily carry it out for himself. I will only observe that breaks or solutions of continuity in the series are necessary and inevitable in the course of nature from No. 1 to No. 4 inclusive ; but ruptures between the higher numbers depend entirely upon the man himself. *Will* is the secret here ; by will, No. 4 hangs on to No. 5. Will is "free" just in so far as it is reasonable, rational, and intelligent, — that is, is joined to No. 5 ; it is fettered just in so far as it is sunk in the body of desire, and by so much is irrational, — as any man may become who habitually gives way to passion. This No. 4 is the place where every man must fight his battle of life, where literally his soul is in the balance. No. 4 is a spiritual *body*, — that is, has size and shape ; it is semi-spiritual, semi-material ; if it is not united with the higher principles, there is nothing to hold it together or keep it "alive" indefinitely after the death of the body. So a man "loses his soul ;" it goes to pieces like Nos. 1, 2, and 3. Some people are so beastly that they make the break between Nos. 4 and 5 before their bodies die in this world. We elbow soulless people every day. They have Jiva enough to move their bodies

about, and a kind of ghost in them which makes them look and act like brutes ; they go through the motions of instinct, passion, and other irrationalities. But come to die, what is there about them to survive the process of physical dissolution that any plant or worm does not also possess ?

The most fateful interest possible hinges upon the connections of No. 5. When a man has thrown off Nos. 3, 2, and 1, and is therefore in the other world, in exactly the state to which his manner of living in this world has brought him, — what then ? Supposing that a break should occur between No. 5 and No. 6, what becomes of Manas, the human soul ? There is no state or condition for him to stay in permanently. If then the link between No. 5 and No. 4 is still in force, the human soul is certainly tending in the wrong direction ; gravitating morally towards matter, not towards spirit ; and if the human soul is thus bound to his passions and desires, he will necessarily seek to satisfy them. According to orthodox Christians, he goes to hell ; according to orthodox Buddhists, he is re-incarnated. The human soul is imperishable, like everything above No. 4 ; but whether he is to lay hold on immortality in spirituality, or to take out his immortality in hell, or in a series of re-births in matter, — that depends. There is something said, in one of the wisest and least understood books extant, about a certain “second death,” which the reader may profitably ponder in the course of his further reflec-

tions on the Manas. To say more here would be to expose the secrets of at least one soul; and these are among the things which, as Paul says, "it is not lawful to utter." Paul was an adept in Theosophy, if his biography is correctly reported.

Respecting No. 6, a word may not be out of place; but it is quite enough to refer to its position between Nos. 5 and 7, and consequently to its relations on either hand, these being those parts of the series which it connects. If No. 5 is still rudimentary in nearly all men who wear the body, and if it is the chief business of life to develop this fifth principle (that is, if a man cares to become immortal), we may readily assent to the proposition that the sixth principle, the spiritual soul, the crowning glory of possible man, his divinity in humanity, is a mere germ or embryo in most persons. Every few thousand years, however, it seems that a man develops it, recognizably to his fellows, before he parts with Rupa. Names of individuals who have accomplished this well-nigh superhuman exploit, or are believed to have done so, will occur to each reader, who may profitably to his own spiritual embryo ponder the way of living which led to such glorious results. The transfiguration of the body of Jesus, for example, supposing it to have been effected substantially as narrated, has always seemed to me the most natural, necessary, and comprehensible event of his life; for if he was filled, as it is said, with the spirit of God before he "died," what

other effect could such an influx of Atma have more readily and reasonably produced? Almost any man's face can light up with No. 5 even, till the muscular and cutaneous arrangements are visibly affected and the features are transfigured in their expression. The consummation of this initial process of No. 5 by the action of No. 6 might be logically supposed to affect every particle of his body ; if so, it would take him, not at all out of himself, but out of this world. Conversely, it is logical to suppose that the only reason why people must die, as they all appear to do, in the present fourth round of the evolution of humanity, is because they do not know how to mature No. 5 and develop No. 6 to the extent of informing all the lower numbers.

Nearly all people live in the gamut of Nos. 1 to 4, with just enough No. 5 to construct syllogisms respecting the lower numbers and indulge in guesses, sneers, or pleasantries respecting the higher ones, according to the bent of their No. 4. This is the necessary folly of "fourth-rounders," as we call those who live up to No. 4 only, and therefore cannot of course be expected to know that the egg of No. 5 which they incubate contains in itself the germ of No. 6 ; consequently, it is never worth while to be angry with such persons. "Karma" cannot be materially accelerated or retarded, and it is much better to wait for it than to interfere with it.

Turning now another facet of the human jewel to the light, let us see how some sets of notions or systems of thought which people have, reflect the facts in the case. The perspicacious reader may have already noticed in foregoing paragraphs how curiously and readily some of our most familiar and homespun expressions fit into this Oriental scheme, which seems at first glance such a strange exotic. Let us inquire into some other names of things now more or less fashionable.

"Science," in the first place. Well, there is science *and* science. Science is only another name for knowledge of any kind. The great difficulty with and defect of most of the accredited and formal science of this day is that it confines its attention to No. 1 almost exclusively. It does indeed look cross-eyed at No. 2, to the extent of observing something there and of wondering what it may be. This natural inquisitiveness sets science to attempt to explain No. 2 by what it knows of No. 1. But science makes a pretty bad business of this, as everyone does who, in any harnessing up, gets the horse's head where his tail ought to be. If I were asked, as a pedagogue, to mark orthodox science for the way it is now reciting its lesson of human life, and 7 were the highest mark, I should set it down about $1\frac{1}{2}$.

The reason is not far to seek. Science, so-called, starts with the false assumption that nothing can be known that the

physical senses cannot discern. The acquisitions of the scientist are therefore confined to such vibrations or joggings or other modes of rude motion as his carbon and lime and sand and the rest of his Rupa can receive and transmit to the parts of him that sit in judgment on these molecular disturbances. As a scientist of this school only knows of Jiva, say, by observing that it jerks him and other people about, he hastily concludes that vitality has no more existence by itself than the horology of a clock. His mistake is this, that he fancies there are no other kinds of matter and no other modes of motion of matter than those of which his body is composed or is susceptible. To a thorough-paced scientist of this complexion, matter exists only as a chemist knows it or as a child who stubs his toe becomes aware of it. With certain dubious loopholes for the possible existence of some kind of stuff like luminiferous æther, or interstellar fluid, or cosmic dust, his scientific attention is absolutely riveted to No. 1. Like all specialists, he magnifies his own hobby ; on the strength and solemnity with which he rides it, you could not compliment him more than by calling him a level-headed, broad-shouldered, full-breasted, stiff-necked, square-toed, rational, agnostic, materialistic, atheistic scientist. In return for which delicate flattery he will tell you all about the "known laws of matter."

But — one moment : Known to whom ? And what kind of matter, in what kind of motion ? And, by the way, whose laws ?

Just as a good physicist knows a great deal about luminiferous æther (even to measuring the velocity of its motions), the very existence of which is unsuspected by most persons, so perhaps a good psychist may know something of some other kind of matter, or modes of motion in it, of which his friend the physicist has no knowledge whatever.

A good psychist, psychic scientist, or scientific spiritualist — for these are all one — has enormous advantages over his friend the mere physicist or materialist. In the first place, the former can find out when he chooses all the latter knows, from ordinary text-books on the subject. Whereas the latter never finds out what the former knows because he thinks he knows it already, and so never takes the trouble to inform himself in the premises ; or else he thinks that what he does not know cannot be found out ; or else that it is not worth knowing ; or for fear of being called a crank ; or for some other reason equally satisfactory to himself. In the second place, a psychist is able to explain, or professes to explain, on a rational basis and according to the definite system of his science, *all* the phenomena which come under his observation. The range of phenomena which he observes and of which he has scientific experience are chiefly Nos. 2 to 5 inclusive. To these we may also add, of course, No. 1, for each of the psychist's ranges includes and rests upon all below them. Whereas, if you ask any mere physicist to *explain*

the simplest one of his phenomena, he is dumb ; and not a single one of his " known laws of matter," nor his whole Rupic code of laws, suffices to account for a single observed fact of his Rupa even, to say nothing of Jiva, Linga, Kama, Manas, Buddhi, and Atma. His plight would be deplorable were it not for a friendly and fashionable guest whom he entertains, and whose name is *Agnosticus*.

Here again, however, it is much to be suspected that the psychist has his Rupic brother at as much disadvantage as before. Psyche used to know Agnosticus when she was younger and less discreet than she has become since she married Nous. She has learned to keep him at a proper distance. Agnosticus is very well in his way and place ; but everything depends upon the use to which you put him. At last accounts Nous had called him an ignoramus, by way of variety from Greek to Latin, and Psyche had set him to sweeping the back-stairs.

But, seriously, rational agnosticism is the most reasonable thing in the world if reason be permitted to fix the limits between the knowable and unknowable. The materialist draws the line between Nos. 1 and 2 of the above schedule. Well, he is right ; for him the rest is the unknowable. But he should not find fault with his spiritualist friend the psychist because the latter shifts the boundary of rational agnosticism farther along the scale. The psychist knows perfectly well that everything

that is in himself and of which he is composed can be known to him ; item, that everything outside himself which corresponds to what is in himself can also be known. He is a person who knows his own Nos. 1 to 4 scientifically ; recognizing, distinguishing, classifying, and describing these several principles, and perceiving their proper relations to one another, which is *science*. He also knows that all these principles are more or less material, with diminishing materiality and increasing spirituality from No. 1 to No. 4. They are consequently to him objective realities ; for he can say of each and every one of his principles below No. 5, " This is not that which I am ; this is but one of my belongings, proof of which I find in the fact that I can think of it as not me ; I can pay attention to it or not, as I can to any other object. My subjectivity, the ' I am I,' is one thing, that is another." Here the psychist has to stop, because he is at the end of his developed principles. He sets his rational agnosticism, which the RUPIC sciolist fixes between Nos. 1 and 2, just above No. 5, because what little No. 5 there is in him does not suffice to carry him any farther. But this is a great way ; and this height is attained only by the exercise of the whole set of faculties from No. 5 downward.

Persons who reach this height are the world's great philosophers, whose love of wisdom makes them wise. But even these do not permit their rational agnosticism to blind them to

the reasonable inference that there may also be some things which they have not found out, owing to the incomplete development of their No. 5. Having before them the reputed examples of some human beings who seem to have known more than philosophy teaches, they have faith at least that the germ of Buddhi may grow up in them in due time.

No system of true philosophy, therefore, should fall short of No. 5, where reason necessarily ends. Philosophy should content itself with reason, not presume to set itself above reason. It is the business of Faith (another name for No. 6 in embryo) to be above reason, even in her rudimentary movements. Those in whom Buddhi — Illumination, or Divine Wisdom — develops do not lose their reason, or necessarily any of their principles, down to Rupa; but they carry them all along, finally exalt reason to their own glorious estate, and drop everything from No. 4 downward. These are adepts, prophets, and seers, — saviors of men, avatars of God, knowing all that men can know. *Their* “rational agnosticism,” — what has become of it?

Returning a little now from a true system of philosophy, which embraces everything up to No. 5 inclusive, how shall we define what a true and proper system of science should be? I should say that science differs from philosophy by only one degree; that is, it takes in everything below and excepting the “I am I” which constructs the system. Leave this out,

exclude subjectivity, and what is left is the objectivity of man and the rest of nature, — phenomena, in a word, as distinguished from noumena. Since all the parts of man, below his “mind,” “Nous,” or “Manas,” are objective and substantial, and more or less material, and are not himself, but his furnishings (as above said already), these are all proper objects of *scientific* investigation, and they furnish the basis and fabric of the proper *system of science*. So far are they from being the “unknowable” (as some falsely assert), that they are not only knowable, but known, as suitable and demonstrable objects of scientific physical and psychical research.

I would therefore most earnestly urge, while I consciously demand, that nothing be called “scientific,” much less a system of science, that is not based upon the *known facts in the case of Nos. 1, 2, 3, and 4*.

If my friends are to be believed, I had quite a reputation as a scientist at one time from some writings I published respecting a few facts I had ascertained about Rupa. I should be disinclined to admit that soft impeachment now; and by the same token I doubt very much if others have not to come up to another standard before I can return the compliment without flattery.

Phenomenal spiritualism, or the set of occurrences and body of facts which go by that name, I consider to be so far an

advance in scientific knowledge beyond the orthodox science of this Sadduceeic day that perhaps I have marked it too low on the foregoing diagram. Much of it (I mean of course the actual facts, without any reference to the lying and cheating that go on under cover of the name), I think, is little above Rupa, or ordinary physical science. Much more of it can be explained by good sound *physiology* that is, on the principles of a physiology which recognizes Jiva, No. 2, as a material force in action. But the scientific facts of Linga, No. 3, are a range of phenomena as common as any delicate experiments in a chemist's laboratory and as well known to psychic scientists as a chemist knows oxygen or hydrogen, — better, in fact, than the physicist knows light, heat, or electricity. I am far from sure that the range of these phenomena which I have observed has not run in some cases up to No. 4 ; but I wish at this present speaking to keep largely within bounds.

Philosophical spiritualism is another and a higher thing, which I know not where to limit in the upward direction. It does not seem to me to stop much, if any, short of discerning Buddhi, No. 6 ; and the religious philosophy which may be based upon it is certainly boundless.

I have said what I think the excellent word “physiology” should really mean. But I wish that the sadly abused term “psychology” could be rooted out of the dictionary or con-

signed to the same limbo where "theology" has already been put by sound science and wise philosophy. "Psychology" means anything, from the vagaries of superstitious spiritualism to a system of mental philosophy or a code of metaphysics. Just as we have the good word "physics" for all the physical or Rupid sciences, I should like to see "psychics" replace psychology; with the distinct understanding that it is to mean the reach of science above Rupa, No. 1, and below Buddhi, No. 6. It would therefore be the range of scientific facts on the planes of Jiva, Linga, Kama, and Manas. Plato meant No. 4 when he spoke of "Psyche;" and the chief interest as well as the greatest utility of psychics hinges on the phenomena of No. 4.

As to orthodox religion, I fear that should I express my convictions, dogmatic theology, as commonly preached in this country and accepted by many persons, would fare worse under my pen than Rupid science; for the simple reason that it does not pretend to be scientific, has slight claims to be considered philosophic, and does not appear to me to more than grope in the dark after Buddhi or Atma. Protestantism in particular seems to me to be the form without the substance and the figment without the fact. I am not now speaking of the spirituality or real religion of any human being, but of professional, formal, or dogmatic theology. As a matter of fact, people's orthodox religion seems to have for the most part got

along without much help from scientific psychics, and to be quite too fine a thing to accept any assistance from physical science. I can make little of it beyond what I once called "homuncular vibratiunculations,"—"those little creeps which little men mistake for true religion." It seems to subsist mainly in the emotions and other perturbations of No. 4 on the part of persons who are worried about their souls,—as well they may be, if half we hear preached be true,—these Kamic fluctuations being undertaken to be quieted by various methods of treatment devised or practised by other persons whose No. 5 is too rudimentary or too weak or too warped to be relied upon.

Religious philosophy, however, is quite another thing, as different from emotional orthodoxy as philosophical spiritualism can be from the mere phenomena upon which it is so securely grounded.

The whole extent of the differences between the various sects and creeds of Protestantism may be safely set down as mere matters of opinion of the least possible real consequence; and any exoteric religion, like Roman Catholicism, that professes to have a monopoly of truth, is open to the suspicion that there is very little about it above No. 4.

If there be any person, or any set of persons, whose range of experiences includes all that men can scientifically know of

human and other nature, and whose sweep of thought touches the rest of the chords in the gamut of the knowable, he or they should know the science of sciences and the philosophy of religion. But nothing short of divine wisdom—which is etymologically the meaning of the word *theosophy*—could exalt human wisdom to such a pitch as this ; that is, could develop No. 6 in man to the extent of fully maturing and informing his human soul. To supplement knowledge by faith seems to be the only way open to man of justifying faith by knowledge as a final consummation of his glorious possibilities.

And how this perfect union of the human and spiritual soul with the One Spirit—this at-one-ment of Manas with Atma by Buddhi—would differ from humanity's becoming one with divinity by wisdom, is a mere matter of words. The seminal stirrings of the spirit in man, the germinal reaction of his nature, inform the visions of the Christian's heaven and prophesy to the Buddhist in his dreams of Nirvána.

The Author of the following contribution to psychics will never be known ; such is his desire, and it should be respected, without inquiry into his motives. Personally he is well known to the Editor as a wise and learned man, highly versed in physics and chemistry, as well as in the art of the medical pro-

fession, of extensive and varied information acquired in nearly all parts of the world, and a veteran spiritualist in the proper sense of the term. The almost invincible repugnance of the true occultist to tell what he knows may be read between every line of his composition. But while thus masking himself, he fences very steadily ; and, so far from overstepping the line of safety, he keeps very largely within bounds. So guarded and reserved is his attitude that something like the foregoing Preface seemed almost necessary to show where he really stands. Thus, for example, when he speaks of " life " he means Jiva, biogen, No. 2 of the foregoing schedule. " Matter " for him is not only its chemico-physical states as known to the schools, but a range of material qualities, attributes, and potencies. His " mind," or " conscious ego," is No. 5. A duality in the nature of man's individual constitution, the " other self," towards which the general drift of his contention goes, is No. 3, the astral form, as a substantial objective reality, and he reaches it by discussing known facts respecting No. 2, the life-principle, or vitality. Thus he finds in man's ghost the actual thing which he desires to establish as the link between mind and matter. Refer once more to the diagram, and observe that No. 3 is exactly intermediate between Nos 5. and 1.

" Can Matter Think ? " may therefore be confidently recommended to those who wish to be helped out of the ditch of

blind physics or crass materiality, and to take the first steps in psychics on safe and sure scientific grounds. It is specially to be commended to clergymen and other teachers who have occasion to instruct their respective charges in anything beyond chemistry and physics, and desire something tangible on which to base their remarks. Professors of religion may recall the objurgation of the Reverend George Herbert, "Woe be to the man who reads but one book!" and some professors of science, who make so many books that they have no time to open the Bible, will find, should they take the trouble, some very pertinent observations with which Ecclesiastes concludes.

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THOUGHT A FUNCTION OF MATTER?

THE law of action and reaction is not limited in its application to the domain of physics. Currents and counter-currents of thought sway men's opinions, and there is drift as well as active progression toward results. The swing of the pendulum is ever from one extreme to its opposite, passing and re-passing a point that lies between, — the point from which alone safe departures can be taken in the search for truth.

The question, Whither are we tending? was never more pertinent than at this period of upheaval and disruption, when the dicta of science and the dogmas of religion, established formulas and cherished creeds, are alike assailed; when untrammelled liberty of thought and freedom of opinion are sweeping away the crude assumptions, the hasty generalizations, the myths and

superstitions of the past, and together with them some beliefs that were well grounded, some truths that, "crushed to earth, will rise again." The positivism and agnosticism that pervade the philosophy of the day are bitterly intolerant even of speculations not in accord with their spirit. On the one hand, we are told that nothing beyond the scrutiny of the bodily senses is attainable ; on the other, that there *is* nothing beyond, or nothing worthy of an effort to attain. But the pendulum will have its swing, the tide its ebb and flow, the magnetic needle its oscillations, and truth will still be found.

It is not my purpose to discuss this subject in its broader bearings, but solely in a special application. Still less is it my design to question the high authority or to undervalue the results achieved by those earnest workers and profound thinkers who have become the exponents of a system of philosophy that has contributed to the sum of human knowledge as much by what it has overthrown as by what it has built up, — a system that has substituted exact processes for loose experimentation, and rational inferences and logical deductions for unwarrantable conclusions and questionable results.

The consideration of Professor Huxley's assertion that "thought is a function of matter" ("Lay Sermons," No. 7) brings us face to face with a problem, insoluble it may be, but of such profound significance, of such paramount importance, that its

discussion is well worthy of our best efforts. Should an attempt to offer a plausible hypothesis, constructed upon a somewhat different basis, result in absolute failure, it must be remembered that distinctly enunciated errors gain a positive value from their refutation, and that no honest endeavor to push inquiry into the realms of the unknown can be altogether in vain, even if no better purpose be served than to indicate a false departure or a lame and impotent conclusion.

Automatism, the strictly spontaneous, automatic actions and movements of organisms, from those of an amœba to those of the highest composite forms, have been most diligently investigated and elaborately described. Reflex action, under the influence of which most complicated movements are executed and most important functions are performed, needs no elucidation here. It is enough to say that the new-born human infant affords as perfect an illustration of complex organic automatism as a single amœba or white blood-corpuscule does of simple automatic acts ; that there may be automatism of sensation and automatic or reflex action in the suggestion of thought ; and that an impulse of volition may respond to a sudden peripheral impression just as surely as the flashes of light that follow a blow on the eye become its subjective reflex creations.

The question is not whether thought may be automatic in origin, but whether it be necessarily and always so. If thought

be a function of matter, it must be referable to that form of matter of which the substance of the brain is made up, and this organ must then be considered a piece of automatic mechanism capable of producing it. That it may be, in a certain sense and partially, is admissible ; but that what we recognize as brain-substance is the prime source, the ultimate cause, of all that is implied by the term "mind," cannot be conceded. Steam machinery may be fitted with many automatic appliances, water and fuel may be supplied, dampers be raised and closed, complicated valve-gear be worked by self-acting mechanism, and still a place and most responsible duty be found for an engineer.

Evidence of automatic action, of effect following cause without the intervention of volition, even in certain processes involving thought, does not affect the question at issue. Brain-substance either is an originator, a creator, fabricating or evolving among the products of its combustion emotion, volition, thought, and every so-called mental attribute, or it is but an instrument of something beyond itself, of something that antedates it, of something because of which it is. Illimitable potency resides in, pertains to, what we recognize as matter, or it does not.

The conception of the potential existence of what I have vaguely designated as something is, it must be confessed, a "ponderously difficult" one. But it must be remembered that the base line of our observations is being constantly extended ;

that problems deemed insoluble have been solved ; that even things called impossible have become accomplished facts ; that the ponderously difficult of yesterday has become less so to-day.

A cursory glance at some of the attained and at some of the prospective results of comparatively recent investigations in various departments of natural science will show that matter, that organized and inorganic forms, that the imponderable elements, as they were called, — more recently, the forces of nature, — are presented to us under aspects widely differing from those of a few years ago.

Impenetrability in a sense formerly employed cannot now properly be applied to any form or condition of matter with which we are familiar, all bodies being made up of molecules separated from each other by distances greater than their supposed dimensions ; a mass of iron, for instance, is not the solid, impenetrable, motionless thing it was thought to be, but an aggregation of particles that are not in contact, that are free to move, and that are in unceasing motion. Professor J. Clerk Maxwell thus states his conception of the state of motion in which are the molecules of the most solid matter : —

“ Visible bodies apparently at rest are made up of parts, each of which is moving with the velocity of a cannon-ball, and yet never departing to a visible extent from its mean place.”

In a recent paper on Atoms, Molecules, and Ether-Waves, Professor Tyndall makes the following statements :—

“ When water is converted into steam, the distances between the molecules are greatly augmented, but the molecules themselves continue intact. We must not, however, picture the constituent atoms of any molecules as held so rigidly as to render intestine motion impossible. The interlocked atoms have still liberty of vibration. The constituent atoms of molecules can vibrate to and fro millions of millions of times in a second. The atoms of different molecules are held together with varying degrees of tightness ; they are tuned, as it were, to notes of a different pitch. The vibrations of the constituent atoms of a molecule may, under certain circumstances, become so intense as to shake the molecules asunder. Most molecules—probably all—are wrecked by intense heat, or, in other words, by intense vibratory motion.”

Heat adds motion enough to separate molecules of water into steam ; but to shake the molecules themselves to pieces requires, as will be seen, the more intense motion of electricity, which, “tearing its way through the molecules of water, gives a motion to the atoms far more intense than that which ordinary heat can give.” And Professor Helmholtz does not hesitate to tell us that “the electricity which permeates all matter, and is like an envelope to all atoms, is itself apparently composed of atoms, only infinitely finer than any others.” Professor Maxwell, to

whom I have already referred, the highest authority upon electricity since Faraday, speaks of particles of electricity, and says that an electric current consists of a file of particles.

Professor Crookes has illustrated what he terms "the fourth state of matter," — a form or condition vastly more rarefied than that of the lightest substance known. Radiant matter, if its existence be verified, gives us another step in ascending series. We may pass from solids to liquids, from liquids to gases, from æriform to radiant matter, and even beyond (I quote from the Introduction to Ganot's "Elements of Physics"), to —

"That subtle, imponderable, and eminently elastic fluid called the ether, distributed through the entire universe, pervading the mass of all bodies, the densest and most opaque as well as the lightest and most transparent. . . . Not merely do the atoms of bodies communicate motion to the atoms of the ether, but the latter can impart it to the former. Thus the atoms of bodies are at once the sources and the recipients of motion. All physical phenomena, referred thus to a single cause, are but transformations of motion."

The "forces of nature," — heat, light, electricity, magnetism, galvanism, the "imponderable elements" of our school-boy days, — have been resolved into "*modes of motion*;" and they are now distinctly recognized as such, each being convertible into the other, all being expressed by the term "*matter in motion*." I quote again from the same authority:—

"In the present state of science we cannot say whether they [the forces of nature] are properties inherent in matter, or whether they result from movements impressed on the mass of subtle and imponderable forms of matter diffused through the universe. The latter hypothesis is, however, generally admitted."

There is a growing tendency to extend this generalization still farther, — to make it cover *Force*, the proximate cause of all motion and all conditions in matter considered as apart from recognized modes of motion. This view has the support of many high authorities, but it is *not the received doctrine of the schools*. It is asserted that certain physical facts are inexplicable under the hypothesis, and that established laws of motion are ignored by it. It is not my purpose to enter into this discussion, but merely to call your attention to the existence of opinions which are as well defended as sharply assailed. I will quote a few sentences that fairly present the view referred to : —

"The physical thing which energizes and does work in and upon ordinary matter is a separate form of matter, infinitely refined and infinitely rapid in its vibrations, and thus able to penetrate through all ordinary matter and to make everywhere a fountain of motion, no less real because unseen. It is among the atoms of the crystal and the molecules of living matter; and whether producing locked effects or free, it is the same cosmic thing, *matter in motion*, which we conceive as material energy and with difficulty think of as only a peculiar form of *matter in motion*."

In this view, potency is not denied to matter, but is relegated to inappreciable forms of it that permeate all ordinary matter, through which its effectual action becomes manifest.

Some recent results of spectroscopic analysis have an important bearing upon the question of the number of substances to be recognized as elementary ; and one of the most distinguished physicists of the day, Mr. Lockyer, has suggested the possibility that the varied forms of matter, simple and complex, are but presentations of diversified properties, of temporary conditions, of that which is essentially one and the same forever. This conclusion, merely hinted at as being within the limits of possibility, is but an expression of theoretical views, for the origin of which we must look back to the remote past, beyond the recognized history of science, to an era when knowledge was attained, if at all, by means we now ignore.

Till within a comparatively recent date, books and lectures on physics supplied merely collections of interesting but disconnected facts, and systematic attempts even to penetrate the mysteries of living organisms had scarcely been made. A few formulas, startling by their complexity, embodied all that was actually known of the chemistry of organism ; and these mere suggestions of possible future progress, these stepping-stones scattered here and there over the approaches to a new field of inquiry, were regarded as supreme efforts of intellectual scrutiny

and acumen. To what dungeons have they led ! In what ponderous tomes have not these records of wrecked cerebration already been entombed !

But a few months ago we were called upon to mourn the close of a career of unsurpassed brilliancy, of unparalleled usefulness, and we felt that a star of the first magnitude had been lost to our firmament. In thought or words we paid our tribute of respect to the memory of one whose earnest love of *truth* for truth's own sake, whose life-long unselfish devotion to the discharge of a holy trust, had gained for him an undying name. There were other zealous workers in the same field, others, doubtless, who contributed their full quota to the brilliant results achieved ; but to him the praise, — *palmarum qui meruit, ferat*, — to him, the calm scholar who had learned "to labor and to wait."

The lesson of the life of Darwin, with its simple honesty of purpose, its self-abnegation, its unrequited, scarcely acknowledged toil, its steadfast pursuit, its grand results, can best be told in such words as these : —

"Keep for yourself the guerdon and the gold ;
What God hath graved, God's prophet must unfold."

Mr. Alfred Russel Wallace, whose name is worthy of nothing less than the second place as a student of nature, writes thus of Darwin : —

“We might have gone on to this day ever accumulating fresh masses of fact, while each set of workers became ever more and more occupied in their own departments of study, and, for want of any intelligible theory to connect and harmonize the whole, less and less able to appreciate the labors of their colleagues, had not Charles Darwin made his memorable voyage round the world, and thenceforth devoted himself, as so many had done before him, to a life of patient research in the domain of organic nature. But how different was the result! Others have added greatly to our knowledge of details, or have created a reputation by some important work; he has given us new conceptions of the world of life and a theory which is itself a powerful instrument of research, has shown us how to combine into one consistent whole the facts accumulated by all the separate classes of workers, and has thereby revolutionized the whole study of nature.”

By the light of evolution, the method and meaning of which Darwin interpreted, page after page of the book of nature can now be read consecutively where before but isolated words and here and there an obscure sentence could be deciphered. Unity in design and singleness in purpose have been recognized where conflict and antagonism prevailed before. Attempts at investigation that were diffuse, erratic, and to little purpose have been systematized; and as a consequence, from divisions and subdivisions that were unmeaning, inefficient from their unsatisfactory processes and fragmentary results, a science has had its birth.

All that is known, all that is to be known, of the reactions between matter that is plastic and life that is potential, of the resultant outward forms and inwrought characters, comes within the scope of biology. Such being the factors in the problems with which the biologist has to deal, with what humility should he approach, with what earnestness pursue, his task !

It has been my object to show, by a glance at the existing status of natural science, that the way has been cleared for inquiries that involve the consideration of what is implied by such terms as "force," "motion," "life," "mind," and "thought," and that we can at least approach their discussion with more confidence, because of new light.

But to return to the point from which so wide a digression has been made, — *the extreme difficulty of the conception of the potential existence of that something of which the brain is not the creator but the instrument, of that something for which and because of which the brain is.*

Professor Tyndall, in his Belfast Address, says, —

"I do not think your theory of instruments goes at all to the bottom of the matter. The telegraph operator has his instruments, by means of which he converses with the world ; our bodies possess a nervous system which plays a similar part between the perceiving powers and external things. Cut the wires of the operator, break his battery, demagnetize his needle : by this means you certainly

sever his connection with the world ; but inasmuch as these are real instruments, their destruction does not touch the man who uses them ; the operator survives, *and he knows that he survives*. What is there, I would ask,¹ in the human system that answers to this conscious survival of the operator when the battery of the brain is destroyed ? ”

The question is well put. It does not, however, admit of a categorical answer, “*except one return from the dead.*” From our point of view there is no hope that a demonstration can be reached, and I can offer but a line of thought that may prove suggestive, as leading toward a solution. Speculations may bear us beyond the support of facts ; they may be freely indulged in, however, and no risk incurred, *provided facts be not tampered with*. For assertions of fact, a man is responsible to the world ; for opinions that are harmless, only to himself.

Professor Huxley says (“Lay Sermons,” No. 12) : —

“Living bodies may be regarded as nothing but extremely complex bundles of forces held in a mass of matter, as the complex forces of a magnet are held in the steel by its coercive force.”

¹ Answer : The Human Soul, *Manas*, the conscious ego, subsisting in reason, intelligence, memory, and volition, acting upon the physical mechanism of the human constitution by the intermediation of the “spiritual body” or animal soul, *Kama* ; which latter survives the dissolution of the physical body, *Rupa*, the dissipation of the life-principle, *Jiva*, and even the disintegration of the astral form, *Linga*, — thus con-

Clearly there is *something* in living organisms besides their determinable chemical constituents and visible material. What is it? A complex bundle of forces held in a mass of matter by another (presumably) simple force, conveys no very definite meaning. The phraseology, however, is entirely in accord with received views, that concede to living organisms no essential characteristics, no distinguishing qualities or attributes, that may not be described as higher degrees of complexity than are possessed by inorganic substance. Life, in this view, means nothing but that a greater number of forces are combined to produce, by movements more complex, forms that are more varied, and to perform functions that are more important than those that pertain to the inorganic world.

It has been very pertinently asked ("Biogen," p. 9), "What is the difference between a *living* and a *dead* amoeba?" I believe it to be a *material* one in both senses of the word; and, *à fortiori*, I believe the difference between a living and a dead *man* to be absolutely, if not demonstrably, *material*.

We know that living organisms are made up of atoms and molecules (or particles) that are in ceaseless motion; we know that their substance is permeated by forms of matter that are

tinuing to give form to the human soul after the death of the lower principles, and to perpetuate individual conscious volitional being for an indefinite period.

vastly more tenuous than their visible material ; and we may reasonably infer that the movements of this matter are of inexpressible rapidity and complexity ; we know that the result of these combined motions is the development and maintenance of composite forms that possess distinctly marked individual characteristics. Of ultimate causation — of the origin of force, of motion — we are profoundly ignorant ; we know of them only through effects produced. The forms, the conditions, all the results attained by living beings, are so radically different from those reached by unorganized substance that we must refer them to an essentially different proximate cause, *which we call life*, of the origin of which we know nothing, but which we recognize by certain manifestations of its presence, chief among them being the *individuality* that pertains to every organism. From the lowest to the highest, it is manifested alike by the outward form, by the inwrought characteristics, by the habits, by the instincts, by the intellectual and moral attributes, of living beings, which are capable of transmission in reproduction.

Professor Tyndall (Belfast Address) says : —

“Those who have occupied themselves with the beautiful experiment of Plateau will remember that when two spherules of olive-oil, suspended in a mixture of alcohol and water of the same density as the oil, are brought together, they do not immediately unite. Something like a pellicle appears to be formed around the drops,

the rupture of which is immediately followed by the coalescence of the globules into one. There are organisms whose vital actions are almost as purely physical as that of these drops of oil; they come into contact and fuse themselves together. . . . In the *Protophytes* of Haeckel we have a type distinguishable from a fragment of albumen only by its finely granular character."

Protoplasm this, or organized matter of the lowest grade, in its simplest expression! A living Moner!

Listen now to a clear and forcible delineation by Huxley of the "possibilities that lie dormant" in a substance scarcely, if at all, distinguishable from protogene or from a fragment of albumen, and of the same chemical constitution, —

"Examine the recently laid egg of some common animal, such as a salamander or a newt. It is a minute spheroid, in which the best microscope will reveal nothing but a structureless sack, inclosing a glairy fluid holding granules in suspension. But strange possibilities lie dormant in that semi-fluid globule. Let a moderate supply of warmth reach its watery cradle, and the plastic matter undergoes changes so rapid and yet so steady and purpose-like in their succession that we can only compare them to those operated by a skilful modeller upon a formless lump of clay. As with an invisible trowel, the mass is divided and subdivided into smaller and smaller portions, until it is reduced to an aggregation of granules, — not too large to build withal the finest fabric of the nascent organism; and then it is as if a delicate finger traced out the line to be

occupied by the spinal column and moulded the contour of the body, pinching up the head at one end and the tail at the other, and fashioning flank and limb into due salamandrine proportions in so artistic a way that, after watching the process hour by hour, one is almost involuntarily possessed by the notion that some more subtle aid to vision than an achromatic would show the hidden artist,¹ with his plan before him, striving with skilful manipulation to perfect his work."

Observed phenomena such as these so beautifully described by Huxley are very commonly ascribed to a "law of nature,"—a term that passes current very generally as a sufficient explanation of all natural processes. It is one that could not well be dispensed with, though in a certain sense it is objectionable: misunderstood, it conveys too much; not thoroughly appreciated, far too little. Laws of nature, to us, are formulated deductions from aggregated observed facts. They express our knowledge of established sequences, embodying, codifying, if

¹ The "hidden artist"—hidden under this metaphor or figurative expression—is, in point of scientific material fact, a stream of what Reichenbach called *biod*, and what I call *biogen*, flowing into a salamandrine mould, and carrying in solution the molecular matter requisite to exactly fill that mould. The mould is the imperishable "form-force" of a salamander, invisible to the physical eye until it is filled with matter in a state of molecular aggregation. It has permanent existence in the "other world," and men who think about it call it the archetype of salamanders.

you will, results of observation ; but they are not edicts, nor are they, in any instance, deductions from *all* facts. They have no supremacy, no executive attribute, and no significance that a single irreconcilable newly discovered fact may not destroy. To say that certain transformations or movements of matter take place in obedience to a "law of nature," is simply to say that they are in accord with an orderly sequence of cause and effect heretofore established by experience, that they are but repetitions of what has been observed before.

The plastic mass, the yolk-substance, of the egg referred to contained certain determinable elements embodied in visible form, plus an unknown quantity,¹ into the value and relations of which it is our object to inquire. It had marked characteristics ; it worked in a certain direction, from which it could not be swerved, toward a definite, a specific end, — namely, to render that mass subservient to individual purposes. Call it "possibili-

¹ Which is the "astral form" of the salamander, an index and equivalent of form-force, working out the physical shape of the salamander in currents of biogen, attracting and arranging molecules of ordinary matter into an exact duplicate or material expression of itself. Grind the actual completed salamander to jelly, dissipate every molecule by means of chemical or electrical action, resolve the salamander into its chemical molecular elements, and you shall not thereby have wiped out or even altered in the slightest lineament the astral form of the creature, which is its salamandrine individuality.

ties that lie dormant ; ” give it what name you please, — it must be admitted that it possessed salamandrine individuality. That something, that a material *in esse*, bearing a definite relation to a salamander *in posse*, lay hidden within that semi-liquid globule, can scarcely be doubted ; nor can it be denied that its functions were continued beyond the embryonic stage to complete the form and to sustain the existence of a salamander and of nothing else. It would have taken, it is true, a more subtle aid to vision than an achromatic to reveal its presence ; but that it was there, is a conception not more difficult than many others of which we are called upon to admit the possibility.¹

Individualism asserts itself from the inception of life ; an ovum is its embodiment. The chemical constitution of protoplasm and of organisms of the simplest type being nearly or absolutely identical, their physical properties presenting no notable dissimi-

¹ Yes, “it was there,” as the author most truly says, — there as the immediate, proximate, efficient “cause” of the salamander, controlling and determining currents of biogen as a means by which molecular matter should be shapen into a salamander. Salamandrine form-force, the akasic mould of the creature, “was there” before the physical body of the creature got there ; and with that measure of intelligence which every individual form represents, it built up for itself an embodiment, by which apparatus of relation the noumenal was brought into relation with the phenomenal world, so far as a salamander can, in the nature of the case, effect that relation. The salamander simply expressed himself in terms of matter.

larities by which one may be distinguished from another, where are we to look for the origin of that specific character, of that distinct individuality, that becomes impressed upon plasma in process of development, if it be not to the co-ordinating, controlling power of life acting primarily upon and through matter, — “life” that is inappreciable to the physical senses, but that has nevertheless a veritable existence? ¹

What objects in nature are more similar than two eggs,—those of a common fowl, for instance? So far as we can determine, two crystals of quartz, though vastly less complex in composition, are not more alike. Mark the widely differing products, the distinct individualities, into which are wrought these homogeneous and indistinguishable masses of plasma. In what had their inception, in what had their progress to an accomplished result,

1 “Life,”—meaning here not that immaterial non-entity which Huxley has so neatly satirized in speaking of the “horology” (time-keeping quality) of a clock, but vitality, or the life-principle, which is materially existent, and is manifested by special modes of motion of a known substance, a non-molecular yet atomic kind of matter, “imponderable,” it is true, and ordinarily inappreciable to the physical senses. It resides in and forms part of the constitution of all matter, and its highest activities—those witnessed in all “living” organisms—are known to us by the phrase “the phenomena of life.” In man it is Jiva, the second—the next to the lowest—principle of the human constitution, only one degree removed from ordinary “matter.” It is dissipated, though not destroyed, by death.

the distinguishing peculiarities of outward form and all characteristics so distinctly recognizable in these products, if not in material factors inappreciable except in the end attained?

Can one human ovum, by any means of scrutiny within our power, be distinguished from another? Can the difference between either and one from an animal of the lowest type be noted? Are they identical, or does each contain within itself something the other does not? Is that something an abstraction, a principle, a force, a law? or is it a material factor, through which the initial impulse is received and the co-ordinating, controlling power, the purpose of life, is worked out? To admit that it *be* a material entity, I am aware, advances us but a step, and leaves the gulf all unbridged as before. *Mais c'est le premier pas qui coûte.* It is my wish to impress upon you the veritable existence of matter in form that is inappreciable, in motion that is intense, and the fact that gradations of such matter of increasing tenuity and mobility have a *place* and a *function* in the animal economy, to which they pertain and of which they are integral parts in the same sense as the grosser, the visible and tangible forms. It is my wish to convey also the idea that a man's essential characteristics, his mental and moral attributes, bear as distinct a relation to an ovum as do his outward form and physical qualities; that hereditary peculiarities of conformation, and that tastes, proclivities, adaptations, —

in short, intellectual and moral qualities, — have a veritable existence that antedates¹ the development of the visible mechanism, which becomes their instrument and is *not* their cause.

There are certain terms, employed both by natural and moral philosophers, by physicists and by metaphysicians, to convey abstract ideas, that have little or no significance as applied to working factors ; that are, in fact, unintelligible except in association with matter. Abstractly considered, as apart from matter, they have no quality or property of which we can take cognizance. To illustrate : we may speak of “ laws of force ” or of “ methods of motion ; ” but we can form no conception of a force that *would* give a rotary or a rectilinear movement, *in case it were in action*, nor can we of a motion that is curved or straight, gentle or intense, *nothing being moved*. We can know nothing of the existence, potential or otherwise, of either the one or the other. And the same may be said of such terms as “ life,” “ mind,” “ thought,” essential to the expression of abstract ideas, to give a name to unknown (perhaps unknowable) quantities ; but apart from their association with living organisms, — their reciprocal reactions, — they have no practical significance. By themselves they express abstractions upon which we can bring neither our perceptions nor our reason to bear. Of

¹ And also “ anteplaces,” — to coin a word ; that is, was somewhere else before, had existed elsewhere.

life that *could* vivify, of mind that *could* control, an organism, if embodied in one, yet never did so, because never so embodied, we can have no realizing sense; nor can we conceive of thought apart from its association with, its communication through, a living being. Its *expression* may be conveyed to the ear, to the eye, may be absorbed and become part of ourselves, but it has no independent existence.¹

Constituted as we are, transformations in matter alone gain access through our senses and become appreciable. From the periphery to the centre,—and inferentially the converse,—from the sensorium to the organs of sense and to the extremities, nerves convey but a vibratory movement. Sound is but the conducted thrill of a membrane set in motion by impinging waves of air; sight but the quivering transmitted impulse of an ether; touch but the transfer of motion turned in its course;

¹ That is, nobody can imagine what an “unthought thought” is. What it may become is found in the thinking of it out. Nevertheless, people have always speculated more about this “no-thing” than anything else. Kabalists call it “En-Soph,”—that which is, yet is no thing. There are numberless other names for this non-entity. Common people call it “God,” and pious ones worship a personification of it under that name. But we are so constituted that it is just as easy to think of nothing as of something. As soon as the thought of nothing is conceived, something has existence,—namely, the thought itself, born of nothing. So, on a cosmic scale, is what the Orientalists call the “night of Brahm,”—a metaphysical necessity, and out of it everything that is has proceeded.

taste and smell but communicated movements. Thus we are but the receivers of imparted motion, "and ideas, like all physical phenomena, may be referred to a single cause, — the transformation [of force] of movement in matter." And what are we — what the "conscious ego" that receives, records, responds to a material impulse — apart from matter, divested from an organism of relation? *Nothing!* Nothing, at least, that can have an objective existence.¹

¹ And this is the reason why we, as conscious egos, are independent of all possible permutations of matter, including those by which our bodies undergo dissolution. If we were some material objective thing, instead of being subjective spiritual realities, our existence would depend upon the arrangement of the molecules of our bodies, and we should cease to exist when these were scattered. Nothing that exists in terms of matter can be we; because we know matter only by our senses, and the only knowledge our senses give us of matter is that it is not we. Matter only affects us by modifying our states of mind; and consequently our knowledge of matter in its ultimate analysis is resolvable into an affection of mind, — of mind, which for each of us owes its existence to the natural fact that we can and must think of it as being "no-thing;" *i. e.*, no other thing that we can think of. The equally natural facts, that we can think of everything else as being not mind, and that everything else requires us so to think of it, is the only evidence we have of the existence of the material world which is not mind. It is a necessary logical conclusion that matter only exists for each of us because we think that it does; and so, if every mind should stop thinking about everything excepting itself, the world would be de-materialized, so far as we are concerned. Take a single specific case, — a lump of sugar. When we say it is "sweet," the

What is life? If it mean movement, change, progress, it is everywhere, — above, beneath, and all about us, pervading all *things* that the most powerful and the most subtle aids to vision enable us to behold. Who shall say, "Here life is; there it is not?" For in nature all things merge the one into the other,

utmost we can really mean is that it has the capacity of producing in us the state of mind we call "sweetness." But that is in us, not in the sugar, in other words, sugar is not sweet unless it is tasted, and, by appropriate machinery, has produced in us a "modification of the internal organ" (*manas*, as the Eastern philosophers call it). The "sweetness" of sugar would be unknown and unknowable if there were nothing but sugar in existence. Mind it is, and not matter, which causes the sweetness of sugar to exist and be known to exist. So of all the other properties, qualities, and attributes of sugar; and so the same for any and all things which are matter, and not mind. Whence it appears that matter only exists in mind, as already said. It is no counter argument for the real, actual, and permanent existence of matter, that it continues to affect us in given ways; that is only to say that we — successive crops of minds, or a continuous series of mind — keep thinking about it in pretty much the same way. It is simply the observed sequence of cause and effect; mind or spirit being so constituted that it cannot stop thinking, — *i. e.*, cannot cease to be conscious of itself, or cease to be modified by everything that is not itself. To *think* "matter," and to be conscious of the modification of itself which results from the thought, is the function of mind. This brings us round again to the dependence of matter upon mind for its knowable existence. If thought were a function of matter, a lump of sugar might be as capable of tasting us and knowing our minds as we are of tasting it when it and we are brought into mutual relations. Perhaps it is; at any rate it ought to be, if matter can think.

there are no abrupt transitions, and lines of demarcation are but artificially established landmarks from which fresh departures may be taken. Not alone in our immediate surroundings, but in the cosmos, in the universe, harmony, — adaptation of parts, each to the other and each to the whole, — prevails everywhere. "The animal fades away by insensible gradations into the vegetable, and the vegetable into the mineral. Element also corresponds to element, and this world to other worlds." In organism, evolution has traced a chain of beings perpetually rising in complexity and importance of form and function, till it has bridged the abyss from monad to man. To understand the conditions under which inorganic matter has taken up this onward march, is as far beyond our comprehension as is the point of the inception of life beyond our scrutiny. Of what undying, inextinguishable flame the vital spark was a scintillation; where begun, and how, this process of development by differentiation; when was first consummated this union of blended material forces, — we are profoundly ignorant. We recognize in organisms, dual in structure and function as in origin, the result of these forces; in man, their highest culmination. Living beings as they are, not as they were or may become, are the objects of our inquiry; and in them, as in all nature's works, we must look for the harmonious blending of mutually dependent parts, and not for incongruities, antagonisms, or disrup-

tions. From the lowest in type, the simplest in structure, to the highest, the most complex, they are molar aggregations of molecules of matter grouped to constitute an individual. They are made up not only of matter that is visible and palpable, but also of forms of it that are rarefied and tenuous to a degree that we can neither estimate nor express, and at the same time that are in motion, the intensity of which is in direct ratio to their tenuity. Can it be doubted that distinguishing individual characteristics in process of embryonic development are referable to these invisible but essential forms or conditions of matter, — of *matter* (I repeat a quotation) “infinitely refined and infinitely rapid in its vibrations, and thus able to penetrate through all ordinary matter and to make everywhere a fountain of motion no less real because unseen?” Of such matter science distinctly admits the existence; its function is, in fact, a physical necessity. Into such forms of matter, of “matter in motion,” the forces of nature, as they were termed, have been authoritatively resolved; pertaining to living beings in the same sense as does their grosser substance, this vastly more tenuous material is made subservient to the same purposes, — namely, to the development and maintenance and also to the performance of the functions of the simplest and of the most complex organisms. “In exquisite adaptation to reciprocal necessities, the parts of living organisms merge one into another, that which

establishes a relation between two, partaking of the nature of both."

The establishment of a relation between mind and matter, between perception and the organs of sense, between volition and the mechanism it employs, has exercised in vain the faculties of closest observers and of most profound thinkers of the Western world. Physicists and metaphysicians alike have been baffled. A third quantity, partaking of the nature of both, must be found, to determine a relation between the two that are given. This quantity must be sought for in *intermediate forms*.¹ The idea is by no means a new one; it is as old as the human mind or body. Mr. Benjamin Howard, in an ingenious and highly interesting paper read some years ago before a London Society, puts it in this shape:—

"We pass from solid matters, such as the metals, to the liquids; from liquids to the gases; from the gases to radiant matter; from radiant matter to the forces of nature,—gravitation, magnetism, light; from force to sensation; from sensation to thought, idea, purpose! Here, too, as with animal and vegetable life, we may well believe that there is no break of continuity; and here also it may be well to direct for the time our attention to intermediate forms, forms of which we can say neither 'These are material,' nor 'These are spiritual.'"

¹ For example, in Nos. 4, 3, and 2 of the diagram; see Preface, p. 13.

For the term "forces of nature" substitute, in accordance with more recent views, "matter in motion," and the same intermediate forms have been presented for your consideration.

It will naturally be said that the assumed interposition of matter, be it never so fine, in motion be it never so intense, leaves the question under discussion just where it was; that thought, though its thread be spun and its warp and woof be woven by mechanism vastly more subtle than that of any visible substance, and that mind, however lofty its aspirations, however grand its achievements, — thought and mind alike are still but functions of matter.

But there is another view, a tenable hypothesis, to which it has been my endeavor to direct your attention.

Living forms are but the outward, visible presentment, the embodiment, of individualities, the material investiture, the moving matter of which has its place and function in the plastic mass of every living germ, upon which germ not only are initial movements impressed, but also a controlling influence is continuously maintained, an influence subservient to individual purposes. Thus interlocked and interlocking, dual organisms, acting and reacting, each filling the requirements of the other, become merged in perfected union, and both advance *pari passu* to the condition of a matured individual. Supremacy, co-ordination, control, *in every instance*; sensation, perception,

volition, *in the higher forms* ; self-consciousness, reason, moral responsibility, *in the highest*, — are functions, inherent qualities, of the one part of every living being of which the other (the counterpart) becomes the outward embodiment, the instrument, the apparatus of relation to present surroundings. That which modifies, controls, uses, is not a function of, is not created by, its instrument, which it antedates, and may outlast.

We find that in the human organism there must be a material intervention between the organs of sense and perception, between its visible instrument and volition, between matter, as it is commonly understood to be, and mind. We find that the “conscious ego” — by which term I prefer to express the individuality of man — must be brought by a material chain¹ into relation with an exterior form, and through it into association with its external environments. We find, moreover, that there is a kind of matter that pertains rather to the ego than to this external form ; matter through which are established and maintained objective relations ; matter that owes not its origin to, and that may survive, the visible substance that has become a non-essential to life, of which it is not the cause.

Positivism recoils — and well it may ! — from such inferences, all unsupported as they are by proof palpable.

¹ See footnote, p. 66.

“ Most learned Don, I know you by these tokens, —
What you can feel not, that can no one feel ;
What comprehend not, no one comprehend ;
What you can't reckon is of no account ;
What you can't weigh, can no existence have ;
What you 've not coined, that must be counterfeit.”

Demonstration of the conscious survival of an operator, as in Professor Tyndall's illustrative case of the telegrapher whose wires are cut, whose needle is demagnetized, whose battery is broken, cannot be reached, as I have said, “ except one return from the dead ; ” and speculative views upon which no crucial test of soundness can be brought to bear, are assailable or defensible, not always in proportion to the modicum of truth, be it more or less, upon which they are based ; their discussion becomes at best a balancing of probabilities that may be indefinitely and fruitlessly prolonged. I am aware that such as I have expressed are peculiarly assailable ; from one standpoint, from the position held by the science of the day, countless facts may be hurled against them with damaging effect. They may, too, be stoutly defended from generally conceded data. But arguments *pro* and *con* are for the most part two-edged swords that may be used on either side of the controversy.

I should be doing injustice to myself as well as to my subject did I not briefly allude to the fact that an immense accumulation of evidence bearing upon the question, supported by the

very highest individual authorities, is necessarily excluded from our discussion. The documents have not the official stamp of authenticity, and could not be received by an orthodox scientific tribunal except by special courtesy, and then as having no positive value. If the simplest asserted facts of spiritualism, mesmerism, clairvoyance, clairaudience, and the like, beyond those which are clearly subjective in their nature, could be conceded,¹ I should hold a vantage ground and be able to reinforce my views with vastly augmented power, if not with a force that would compel conviction.

¹ The only thing in the whole range of these supernormal and usually supersensuous phenomena which has got any standing in the scientific court is mind-reading, or thought-transference, which has been invested with the scientific name of *telepathy*, and so made quite respectable. To illustrate telepathy with reference to the diagram given in the Preface: Suppose A thinks something, and wants to make B think the same. A's thought is in his mind; that is, in his No. 5. By physical means he can only get it out of him, and transfer it to B, by filtering it down through his Nos. 4, 3, 2, and 1, when it finds its expression through his body; that is, through some look, word, or move of A's. He may kick it into B literally, or talk it into him by exciting sound-waves of air which impinge on B's ear-drum, or look it into him by means of light-waves which fall on B's eye. In any case, before the thought can reach B's mind, or Nous, it has first got to strike his body physically and mechanically, and then be soaked up through B's No. 1, 2, 3, 4, and 5 successively, before B can think what A thinks,—a tedious, roundabout process, truly, to which men are for the most part subjected. But is there no shorter cut from A's No. 5 to B's No. 5? *Any* shorter cut that

Permit me to tax your patience but a few minutes more by a brief epitome of what I have most inadequately conveyed.

The distinctive individuality that characterizes living beings pertains to a germ as well as to an embryonic or a matured form.

evades the physical body would be telepathic to some extent. The following rude diagram will illustrate

Modes of Thought-transference from A to B.

Each of these planes has its own appropriate medium of transference,—a kind of sublimated ethereal semi-material substance, vibrations of which constitute the actual means of communication. Every one knows, of course, the phenomena which occur on plane No. 1; transfer of thought by writing, talking, are familiar instances. The phenomena of animal magnetism, mesmerism, etc., are examples of thought-transference on the plane of No. 2, or biopathy. Higher and more direct reaches of telepathy, on the planes of Nos. 3, 4, 5 respectively, are witnessed in various

Specific characteristics have a material embodiment (in matter in motion) that bears a fixed and definite relation to the prospective resultant of such movements as are imparted by it to the appropriate plasma with which it is brought into relation at what may be termed the inception of life.

Life, of which we know nothing in the abstract, in the concrete is a material embodiment of individuality which a living organism possesses and a dead one does not.

Living organisms are dual in nature ; the two associated parts may well be termed positive and negative elements, the one being active, co-ordinating, and subjective, while the other is passive, plastic, and objective.

The relation expressed is an unvarying one ; and up through the chain of being this duality of organism is constantly maintained, with never a break, till we behold in man its full significance and realize its true import.

Action and reaction between the parts are reciprocal, and result in the adaptation, more or less perfect, of each to the re-degrees of clairvoyance, clairsaudience, somnambulism, "mind-reading," and constitute phantopathy, psychopathy, or noumenopathy, as the case may be. The lower phenomena of "spiritualism" are largely phantopathic. Theosophical adepts in the flesh habitually employ noumenopathic telepathy. The London Society for Psychical Research has demonstrated several degrees of telepathic thought-transfer.

Poor Miss Science ! If she only knew what a pert young minx that flattering seducer Agnosticus once made of her !

quirements of the other ; but however intimate their blending, however close their union, there can be no interchange of essential characteristics, established, fixed *ab ovo*.

In this view there *is* an operator, whose battery is the brain, whose wires are nerves, but who is not necessarily obliterated by the disruption of his instrument. In this view thought is a function of matter ; but the part of the brain, though an important, is a secondary one. It is truly an instrument, acted upon, employed through the intervention of vastly more subtle material, of which it is not the creator. This more subtle material is a peculiar kind or state of matter pertaining to life and to that which, apart from a material embodiment, can have nothing but a purely negative or subjective existence, which we can express only by the Buddhistic "Nirvána," — the condition to which rises an immortal spirit freed from the last trace of matter, divested consequently of form, and loosened from every outward relation, —

"All life is lived for him, all deaths are dead."

Science finds in the waste of brain-substance the coefficient of thought, of all mental action. Emotion, volition, imagination, memory, understanding, are the equivalents of determinable quantities of the fatty mass. Our affections and memories, our loves and hates, our hopes and fears, may be expressed in beef and bread, if the equation be a perfect one.

Past experiences are all a man can gain from the life he has lived; what would he be without memory, the faculty that makes them his own—memory, the principle of spiritual continuity? What would he be without the record that has outlasted many brains? So rapidly do particles succeed each other in this marvellously delicate organ, so constant are waste and repair, that the brain of to-day is not the brain of yesterday. Complete renewal is accomplished in variously estimated but very brief periods. Part after part falls into line and fills its place in the economy, to perform its function and then to give way to fresh material. All tuned in accord, harmony of action is the result, till for a time jarring, “like sweet bells jangled, out of tune and harsh,” the fabric falls in dissolution. “The hand is gone!” Can we say, “The record tarries yet?”

Inordinate and *unreasoning* credulity in the past has been replaced by extreme and *unreasonable* scepticism in the present. But a reaction has set in, a counter-current of opinion is established; the pendulum is on its backward swing, the needle is again approaching its cardinal point. A just mean, more favorable to progress, more in the line of truth, will be reached and doubtless passed, as has been the case before.

“In mediis rebus tutissimus ibis.”

APPENDIX.

AN EXCURSION TO SCIENTIFIC GHOST-LAND.

WHAT may be visible to the soul's eye which pierces the veil of Isis? Let us see what the mind's eye of sober science has scrutinized in the chemical and physical fabric of that veil which no man's hand has lifted.

The least particle of matter that can be known by the physical senses to exist is a "mass." A mass is the least quantity of matter that has any sensible physical properties. A mass is made up of "molecules." A molecule is the least quantity of matter that has any sensible chemical properties. A molecule is made up of "atoms." What an atom is, no one knows. Nevertheless, science can *weigh* atoms, and estimate how many molecules there are in a given space, how heavy they are, and how fast they move about. Let us see some of these things.

The molecule is the assumed unit of the physical structure of matter, and the atom is the presumed unit of the chemical structure of matter. To study these points, we will take some gas or air, like hydrogen or oxygen gas, or like the air we breathe. There are certain well-known properties of all gases, of which we will enumerate three:—

1. The same volume of all gases, at the same temperature and pressure, contains the same number of molecules.
2. The volume of a given mass of gas, under constant pressure of surface impacts, varies directly as the absolute temperature.
3. The volume of a given confined mass of gas varies inversely as the pressure.

Recognizing these facts, and making suitable experiments, science reaches the following conclusions:—

How big is a molecule?

The actual size of molecules is probably between $\frac{1}{1,000,000,000}$ and $\frac{1}{250,000,000}$ of an inch in diameter; or about as much smaller than a pea as an orange is smaller than our earth! The diameter of a molecule is also about $\frac{1}{20,000}$ as long as a medium length of a wave of light! And remember, it takes at least two atoms to make a molecule.

A cubic inch of gas at ordinary pressure and temperature contains one hundred thousand million million molecules! An absolutely unthinkable number! It is 10^{23} —ten raised to the 23d power, giving a string of figures as follows:—

100,000,000,000,000,000,000,000!

How far apart are molecules?

Venus and our Earth are two planets of very nearly the same size. During conjunction, — that is, when nearest each other, — these planets are still separated by a distance equal to about three thousand of their own diameters. This represents, relatively to the size of molecules, about the extent of a mean excursion of a molecule of atmospheric air, at ordinary temperature (60° Fahrenheit) and pressure (thirty inches barometer). Molecules brought together to about fifty of their own diameters would still be separated by a distance, relatively to their size, half as far again as the Moon is from the Earth, — which would represent their mean distance apart in our atmosphere at ordinary temperature and pressure. Being constantly in motion, molecules collide with one another incessantly, and this collision is assumed to be actual *dynamic* contact. Such contact represents the normal condition of molecules in all liquid and solid aggregations, or molar masses.

But remember that this so-called “contact” is only the nearest approach together of the molecular dynaspheres, the dynasphere being the sphere of a molecule’s attraction and repulsion, or other physical potency. It is no contact of the inner congeries of the solid atoms composing the molecule; for of any such *material* diameter of a molecule we know nothing. We only know inductively that when the molecules are in actual dynamic contact, the distance from centre to centre is from the $\frac{x}{1,000,000,000}$ to the $\frac{x}{250,000,000}$ of an inch, which estimated distance is taken as the effective size of the molecule; that is, as the true diameter of its dynasphere.

We will be unscientific enough for a moment to ask, What is a “dynasphere”? Is it something, that is, matter; or is it nothing,

that is, space? If the latter, then a molecule can affect another without any physical means of communication or any known medium of the transfer of force; that is, molecules have purely spiritual intercourse. If the former, then every molecule is bathed in some subtle, rarified, infinitely attenuated kind of stuff, not any matter known to the chemist, but something like biogen, or od, or akasa, — a sort of molecular perisprit. Which of these two theses is the more credible? Which is the more discreditable horn of a very awkward dilemma? But to return to facts and figures.

How fast do molecules move, and how far do they travel?

A molecule vibrates or oscillates within certain limits of distance, in proportion to its size about as far as the distance between Venus and the earth in proportion to the size of these planets. A hydrogen molecule travels at a rate of 6,000 to 6,500 feet a second; a nitrogen molecule about 1,754; an oxygen molecule about 1,640. At this rate, an oxygen molecule would collide with its fellows about 7,000,000,000 times a second. The livelier hydrogen molecule would hit some 17,000,000,000 other fellows every second of time!

The molecular vibration of the air we breathe is about $\frac{1}{300,000}$ of an inch, or about $\frac{1}{6}$ of a wave-length of yellow light. That is to say, a string of 300,000 molecules darting one after another at full speed, and farther apart from one another than the Moon is from the Earth in proportion to their size, would only reach an inch.

How much do molecules and atoms weigh?

Since every gas, at the same temperature and pressure, has the same number of molecules in the same space, the weight of the

individual molecules of any gas must be proportionate to the weight of the gas itself. A cubic yard of the air we breathe weighs 2 pounds. A cubic yard of hydrogen gas weighs $2\frac{1}{2}$ ounces. The weight of molecules and atoms is estimated as follows :

Hydrogen is the lightest substance that can be weighed. What is called a "crith" is the weight of 1 litre (about $1\frac{3}{4}$ pints) of hydrogen, in a vacuum, thermometer 32° F., barometer 30 inches. A crith is about 0.09 of a gramme ; a gramme is $15\frac{1}{2}$ grains ; a crith is therefore 1.7222 grains. Now as there are some billions of billions of molecules in a litre of any gas, it will be convenient to represent this by n . Then each molecule of hydrogen weighs $\frac{1}{n}$ criths ; and since oxygen we know is 16 times heavier than hydrogen, the oxygen molecule weighs $\frac{16}{n}$ criths. But a hydrogen molecule consists of two atoms ; then each atom weighs $\frac{1}{2}$ a crith. This half-crith is called a "microcrith ;" and the microcrith thus becomes the standard for the "atomic weight" of all bodies.

A hydrogen molecule weighs 2 microcriths.

An oxygen " " 32 "

A nitrogen " " 28 "

A molecule of water " 18 "

Of course this is no actual weighing or absolute weight either of molecules or atoms ; but it is their comparative weight, taking hydrogen, the lightest substance that can be weighed in bulk, or mass, as the standard.

This way of getting at the relative gravity of all substances which have a molecular structure brings all kinds of chemical

matter into the category of what are therefore called "ponderable elements," — things that have sensible *weight*, if you weigh enough of them. For it must be borne in mind that these obdurate "scientific ghosts," these hard-headed atoms, composing hard-hearted molecules, are very real, impenetrable things; though they are ultra-sensible, transcending our sensibilities, a finite, calculable number of them can be weighed on platform scales, and in the form of a cannon-ball, for example, do very effective work, — being as potent on the physical plane as a real ghost is on its own plane, where it weighs as much less than an atom as a dynasphere weighs less than a molecule.

What now of the so-called imponderable elements?

All the foregoing kinds of things are coarse, heavy, gritty, slow and dull in comparison with the kind of stuff called luminiferous ether, the vibrations of which make the *light* we see with — though nobody has ever seen light itself in this world.

Light is a wave-motion or undulation of this ether, proceeding by radiation from some luminous body, as the sun or a candle. The ether itself does not move along, but the wave-*motion* travels along the ether, at the rate of 192,000 miles a second — about a million times faster than sound goes; for sound-waves of ordinary air only get along 1,100 feet or $\frac{1}{3}$ of a mile in a second.

The waves of light all progress at the same speed, 192,000 miles a second, but different *colors* of light are due to the difference in the lengths of the waves of differently colored light, and their number of oscillations in a given time. Thus, taking the three colors — blue, yellow, and red — there are in an inch 51,000 blue waves,

44,000 yellow waves, and 39,000 red waves; these numbers of course expressing the absolute as well as relative lengths of the waves of these colors respectively. But how fast is the *motion in these waves*? What number of oscillations or vibrations in a second of time?

Red oscillates 477,000,000,000,000 times a second.

Yellow oscillates 535,000,000,000,000 times a second.

Blue oscillates 622,000,000,000,000 times a second.

Violet is still quicker in its oscillations, giving 699 with the same twelve ciphers after it.

Now we see that the velocity increases towards the violet end of the spectrum. Then light gets too fast for our slow eyes,¹ and all is dark beyond. What, indeed, is beyond? That is "The light that shineth in the darkness, and the darkness comprehendeth it not."

Neither matter nor motion can be conceived to stop there. But what kind of motion in what kind of matter goes on?

Sound is a million times *slower* than light. How many million times is the laggard light slower than *thought*?

¹ The microscope has been brought to such a pitch of perfection that the difficulty of getting any further in seeing through it is no mechanical obstacle or defect of construction, but simply the coarseness of light itself and the dulness of our eyes. The instrument is capable of much better work, but "the light is too coarse," as microscopists often complain, to show its finest effects. Of course, when an object is so magnified in the microscope that we can see marks on it that are no larger than light-waves, light becomes itself an obscuration or screen from further vision. An eye sharp enough to see and a microscope strong enough to show objects as fine as the vibrations of the ether that is beyond the visible violet end of the spectrum, would then comprehend the light that shineth in the darkness, and be bathed in a splendor the glory of whose radiance is to us now inconceivable.

But to return to our science. *Heat* is a kind of motion, and nothing else. Heat proceeds, or is conveyed, in three ways. When heat is conveyed by *convection*, as it is called, it affects masses directly, as you may ascertain by putting your finger in a candle. When it is conveyed by *conduction*, as from one end of a bar of iron to the other, it affects molecules. When it is conveyed by *radiation*, it affects atoms.

Light is much finer and swifter; it only goes by radiation, and only affects atoms. Thus, a ray of blue light communicates 699,000,000,000,000 impulses or shocks to atoms in a second of time. What kind of a shaking up is this?

It has been supposed, with good reason, that atoms rotate on their axes, like tops spinning, and also revolve in elliptical orbits, like the earth around the sun. And these orbital revolutions of atoms are supposed to be affected by light, in a way that makes them faithful transcripts or exact reflections of what is called the "amplitude" of light-waves. The brilliancy of light depends upon this amplitude. Lights vary in brilliancy 40,000,000,000 times, representing a difference in amplitude of their waves of 200,000 times. Hydrogen flame has a spectrum, and the fixed red, green, blue, and violet lines of its spectrum show distinct "periodicities," or orbits of the hydrogen atoms, of from 456 million million to 729 million million revolutions in a second of time.

All this atomic cosmos goes on in certain spaces smaller than molecules, and of molecules there are one hundred thousand million million million in a cubic inch!

How far off are the stars, and how far apart are they then?

The Sun is about $92\frac{1}{2}$ million miles from the Earth; ¹ light comes that journey in eight minutes. The nearest fixed star is Sirius. The "amplitude" or brilliancy of the light of Sirius is $\frac{1}{1,315,000}$ that of the sun-light, and it takes twenty years for the light from Sirius to get here. Some stars are a thousand times farther off. If some event on Sirius could be *seen*, it would have happened twenty years ago by the time we saw it.

But it is as easy to think of Sirius as of these words. *Thought* goes as instantaneously to that star as the eye falls upon this paper.

Neither time nor space is an objective reality, or even what it seems to the senses to be. Time is the eternal continuity of mind with itself. Space is the boundless contiguity of mind with matter.

Can mind come in contact with matter? How closely can mind apply itself to matter? How small are the *spaces* occupied by matter that we can perceive by our bodily senses?

A man tried once to see how many parallel lines he could cut in an inch of glass. Nobert found he could mechanically engrave on glass 112,000 visible lines in an inch; for his "19th band" can be thrown upon a screen and every line be distinctly displayed to a roomful of people. Indeed, his mechanical contrivance went beyond his sight; for he managed to cut 224,000 lines to an inch with almost mathematical accuracy, though they remained invisible. The lines of his 19th band were only about half as thick as the

¹ A certain calculation in the possession of the writer, made from data derived from the Great Pyramid of Gizeh, makes the distance 92,285,568 miles.

distance apart of two flat glasses pressed together with a pressure of 1000 pounds to the square inch. They were about $\frac{1}{500,000}$ of an inch thick, and were distant from each other about $\frac{1}{2}$ the length of a wave of violet light, or $\frac{1}{3}$ that of a red wave. One to three of Nobert's *visible* lines could be laid in the trough of a light-wave.

A soap-bubble can be blown up till the film of water is about $\frac{1}{196,000}$ of an inch thick, which is less than $\frac{1}{4}$ the length of a wave of red light; so that 4 or 5 thicknesses of such a soap-bubble could be wedged together into the trough or hollow of a light-wave.

It takes 882,600 foot-pounds, or 4 tons lifted 100 feet high, to tear a pound of water into steam. We can estimate the weight of a square inch of soap-bubble, and so the force required to wrench its molecules asunder. A soap-bubble reduced nearly to $\frac{1}{500,000,000}$ of an inch in thickness would probably be a film or sheet of molecules about one molecule thick, and to tear this would be equivalent to volatilizing it into steam. At this degree of thinness, $\frac{1}{500,000,000}$ of an inch, the film is $\frac{1}{12,000}$ as thick as a wave of light is long. But the film before the bubble bursts is certainly less than $\frac{4}{1,000,000}$ of an inch thick; a square inch of this would only weigh $\frac{1}{1,000}$ of a grain; and the eye can see $\frac{1}{100}$ of a linear inch, or $\frac{1}{10,000}$ of a square inch. So, while we admire the splendid Iris of the bubble, we can look at a quantity of water weighing $\frac{1}{10,000,000}$ of a grain.

Some souls can also see the rainbow of this bubble of the world.

If then mind cannot quite come in contact with matter,—can matter come in contact with matter? Can any thing touch any other thing? It is impossible. The atomic abyss is as unfathom-

able as the interstellar void is immeasurable. At a pressure of 1,000 pounds to the square inch, two plates of glass pressed flat to each other are still $\frac{1}{250,000}$ of an inch apart — very far from touching with absolute contact, even in bulk or mass. Strike a blow with a sledge-hammer on a steel crowbar. If the bar is a foot long it takes $\frac{1}{18,000}$ of a second for the blow to get to the other end of it; if 7 miles long, the blow would be 2 seconds in travelling from one end to the other. Assuming the nearness of the hammer to the head of the bar at the instant of the blow to be even $\frac{1}{1,000,000}$ of an inch: the time required for the blow to traverse this distance is $\frac{1}{216,000,000,000}$ of a second; plenty long enough, nevertheless, for atoms of steel to perform 20,000 to 30,000 of their revolutions or oscillations.

In fact, the hammer never touches the bar at all. But it strikes the blow, all the same. *What is the medium of the transfer of the "force" of the blow from the hammer to the bar? What is the "dynasphere" of a hammer?*

Matter must act on matter either at some distance, or at no distance. It cannot act at no distance, for it never gets there; therefore, it must act at some distance; therefore, it only acts where it is not.

This is the celebrated Paradox of Zeno.

The fact is, matter never acts on matter, either where it is, or where it is not. In the above illustration, the sledge-hammer does not drive the crowbar; the man who slings the hammer does that.

It is not even his arm that does it. Nor his head, nor any thing that is in his head. The man himself does it.

“Can matter think?” Yes, if a hammer can hit a crowbar. But if it has no mind to do this, it has to get a man with a mind to strike the blow.

No explanation is final till there is nothing left to be explained — till it is pushed to the inexplicable, and no explanation satisfies the mind unless it rests upon the incomprehensible.

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