GLIMPSES

OF

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BY

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"This I dare affirm in knowledge of nature, that a little natural philosophy, and the first entrance into it, doth dispose the opinion to atheism; but on the other side, much natural philosophy, and wading deep into it, will bring about men's minds to religion." — BACON.

BOSTON

D LOTHROP COMPANY

FRANKLIN AND HAWLEY STREETS

# PREFACE.

"CANST thou by searching find out God?" "If a man die, shall he live again?" These were the questions that already concerned the Chaldean seer, and that ever since have been uppermost in the minds of thinking men. They are the questions that every philosophy and every religion has attempted in some way to answer. The answer that on the part of Christian thinkers has from time to time been given to the first of these questions has been determined by the understanding that has been had of its meaning. Those who have understood Job to be speaking of a comprehensive knowledge of God, have answered his question in the negative. In this sense it is felt that God cannot be found out by searching. But those who have understood Job as speaking not of a knowledge comprehensive but apprehensive, have usually answered his question in the affirmative. It is now conceded that God may be apprehended, that is, that his existence as the result of searching may be affirmed. This was the opinion of the great Schelling. He expressed it as his belief, "that a thoroughly rational perception of the existence of a personal being as the author and

ruler of the world, would be the ultimate fruit of a thorough and comprehensive speculation." In the opinion of the author of this book this prophecy of Schelling's has already been fulfilled. In his humble judgment the time has already come when the Christian idea of God may be said to have been intellectually apprehended by the thinking mind not only in the Church, but also in the philosophical world. A few of the reasons upon which he bases his judgment are given in the following chapters.

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# FORCE.

"I deem it just as absurd and illogical, to affirm that there is no place for a God in nature, originating and controlling its forces by his will, as it would be to assert that there is no place in man's body for his conscious mind."—Dr. W. B. Carpenter.

"The convertibility of the physical forces, the correlation of these with the vital, and the intimacy of that nexus between mental and bodily activity, which, explain it as we may, cannot be denied, all lead upward towards one and the same conclusion, the source of all power in mind; and that philosophical conclusion is the apex of a pyramid, which has it foundation in the primitive instincts of humanity."—Dr. W. B. Carpenter, "Mental Physiology," chap. xx; p. 696.

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## FORCE.

For He spake and it was done, He commanded and it stood fast. — PSALM xxxiii. 9.

IN the early history of Science, the attention of men was mainly directed to matter. Whence comes matter? What are its laws? What is matter in itself? These are the questions with which men of science were long concerned.

The past century, however, has been characterized by the intensity of its efforts to solve two other problems, namely, What is force? What are its laws?

In the thorough study of matter it was found that little could be known as to its nature. It was found that some of its laws could be determined, but that matter itself could not be defined. But while the study of matter, so far as enabling

the investigator to affirm what it was, was concerned, proved unavailing, it was not without its profit; for the inquiry of the present times in regard to force, has but sprung out of the inquiry of the past in regard to matter. The study of matter revealed the truth that nothing could be known of it except through its manifestations of forces; and thus out of the fruitlessness of investigation in one direction, has come the more fruitful research in another.

But now, when we consider the universal prevalence of force in our world, as well as the functions which it performs, it seems strange that its successful investigation, as well as the formulating of its laws, should have been deferred until now; and yet the progress which has of late been made in this most interesting department of our knowledge, may at least in some measure atone for the years of former ignorance.

The task which we have assigned for ourselves in the present lecture, is, to make ourselves acquainted as far as possible with this invisible something which we call "force." The first thing in our study of nature with which we are impressed is, the universal prevalence of force.

Here we find it manifesting its presence in heat, there in light. Here in electricity, there in chemical affinity. Here in magnetism, and there again in motion; for we must not forget that these various terms, heat, magnetism, light, and so forth, which we use when speaking of these various phenomena, are, after all, but different names for the one thing called force, and are simply meant to describe the different modes of its manifestation. Indeed here in the present universe force is more universally present even than matter. Unrest everywhere implies the presence of force, and there is nothing at absolute rest. The rocks that sleep on the mountain-side are not at rest. So far as appearance goes they may not have changed position; they may seem to have rested in the same position which they now occupy since the morning of creation, and yet throughout their structure there has not been a moment when there has ceased to be movement.

Heated under the sun, or cooled by the passing cloud, every change in temperature has produced a molecular change throughout their whole structure. Slow chemical or electrical actions, even light, or

some invisible radiant forces are ever at work, in some way affecting them; so that at no moment can they be said to be at absolute rest. In the ocean stretching itself in the sunlight and unruffled by the faintest breeze, mighty forces are at work. In the ether, here in the atom, or there in the far-away nebular spaces, forming a world, force is at work, in one or another of its numerous forms; but when we consider force in its relation to ourselves, in every function of life, it assumes a new interest.

It is not until we ask ourselves what we might do and be if force were not, that our real dependence on it, as well as the integral part that it really plays, begin to appear.

Take, for instance, the force locked up in the sunbeam. Never was an unweaned child more dependent on its mother than are we on the sun. We need heat, we need water, we need food and clothing. For our highest happiness, commerce and the various industries must be. But the power that makes all these possible is to be traced to the sunbeam.

Coming down through the ether it strikes somewhere the earth; let us say that it falls on an ex-

panded sheet of water, on a pond, a lake, or the ocean. Here its force, in the form of heat, changes the particles of water nearest the surface into steam; and then, lifting these steam atoms aloft into the atmosphere, bears them away in the lap of the storm, perhaps beyond the tropics or the Arctic Circle. By and by these particles, having been condensed, fall in rain. Rushing down the hillsides in torrents they fill the channels of the river that carries our commerce to the sea. Here, driven by the force of the sun, transformed now into wind, this commerce is carried abroad to other nations of the earth, and the ships again return, laden with the products of other shores.

And thus you see, when we begin to trace the force of a single sunbeam, how wide our field is, and how numerous the modes are that force may assume. Nor is this all. No sooner has our river reached the sea, bearing on its bosom the products of the soil, than it is again pumped up by the force of the sun, falls again in rain, and the force expended in lifting is now transformed into the kinetic force of the river, which as it moves on again to the sea turns the mills and the factories that grind the meal for our bread, and spin the

fabric for our garments. All this does the force of the sunbeam do for us, as falling quietly, and, as we perhaps thought, without effect, on the water. But suppose now that our ray, instead of falling on the pond, or lake, falls on the land; its effects would not be less marked. Here it would produce vegetation and set in operation all those hidden springs of life, which, manifested in forms of beauty or of use, make it possible for us to live. And so, were we to trace the matter still further, it would be easy to show that there is not a function in your life or mine, not a portion of the organic world around us, not an atom or a world in the universe, with which force has not something to do, and in the building up and conditioning of which it is not a prominent factor.

But we have now gone far enough to ask the question, What is force? What is this invisible, intangible something which now here, now there, is constantly solving for us the problems of existence? What can we know about it?

It is characteristic of the thinking mind that it cannot be satisfied by a study of phenomena simply. For a time it may interest itself in mere appearance, in the observance of variety in phe-

nomena; but by and by it ceases to be satisfied with this, and seeks to know what that may be that lies back of appearance, the something that is the cause and condition of appearance. Thus it was that for a time men were satisfied to regard force simply on the side of its manifestation or appearance. They scrutinized a body as it fell to the earth, and studied out the laws of its descent. They watched the flight of projectiles; measured their momentum. They watched the planets as they sped on in their nightly orbits, watched carefully their behavior, and formulated the laws governing the heavenly worlds. To-day, however, men are pushing their investigations further; they are getting more nearly than hitherto into the holy of holies of nature, and are studiously endeavoring to know force in its essence. They ask, What is this unseen, imponderable, immaterial something, this ever-present factor called force? No question has been of greater interest, nor is it strange that it should be more easily asked than answered. As long as force was regarded merely as motion, or resistance, it was easy to define it. Then it was sufficient to say that force was the power that produced motion or resistance. But unfortunately

for that definition, it has been found that motion is only one out of many modes of force; that heat, light, electricity, attraction, chemical affinity and the like, are also forces just as truly as is motion. It was found, also, that force had that which related it more nearly to the realm of mind than to that of matter, and that in order to explain many of its operations, an intelligence somewhere had to be supposed. And thus, as men attained a truer conception of force, it was found that the definition that made it simply the power to produce, or to retard motion, was too narrow, and that that definition did not define force at all, but only motion, which is but one of the modes of force. Nor does the more recent definition, that makes force a push, pull, or weight, as the case may be, seem to be more satisfactory. For while these may be the measures of forces operating in certain ways, it is clear that neither of these definitions define force; for force is manifestly that which lies back of the push, back of the pull; the thing that causes the weight or pressure. Between force, and the effects or manifestations of force, there must be a wide distinction. "They differ, in fact, in precisely the same way as length or

breadth differs from superficial area. And this modern abuse of the word is no more outrageous alike to science and common sense than would be the attempt to assign the height of a mountain in acres."* Indeed, it has come to be admitted as strongly probable that there is no such thing as force as it is ordinarily conceived, any more than there is such a thing as sound or light; and yet we must retain the term as designating certain phenomena which are constantly appearing, just as we must retain the terms "sound" and "light," though it is clear that they have no existence as things.

But now when we have come to regard force no longer as a thing, that is, in the sense in which matter or substance is a thing, we have gone a great way in coming to a true conception of what force is in itself; and if we have accomplished no more by this advanced step, we have at least relegated force from the realm of the seen to that of the unseen, and have come by that much nearer to determining its origin.

And here we may venture on a definition of force, which must stand or fall, according as to

* Unseen Universe. p. 104.

whether it describes and explains the thing defined. A true definition must always be a description which manifests as far as possible the nature of the thing defined; it must add to our knowledge of the thing itself. Of every scientific definition we may demand that it give us some insight, not alone into the method, but that it also set before the mind the idea according to which we may interpret not one, but all the phenomena of a class.

Conforming, then, to these requirements, what now is force? Our answer is: Force is voluntary energy, directly or indirectly applied. As now existing in the universe, it is voluntary energy indirectly operative. But as to its origin, in time all forces must be traced to voluntary energy, emanating from a personal will.

Let us now give ourselves to the task of determining how far our definition will go in explaining the facts, and whether, in its application to the laws of force as already worked out, it will stand.

The scientific history of the last century was marked by the discovery of two great principles, known as the "correlation" and "conservation" of forces. In the little town of Woburn, Mass.,

in the year 1753, was born Benjamin Thompson, afterwards known as "Count Rumford." One day, in the discharge of his duties in the Munich arsenal, he observed the large amount of heat generated in the boring of a brass cannon. At once he proposed to himself the question, "Whence comes this heat produced in this mechanical operation?" In order to solve the problem he entered on a long series of experiments. Repeating the operation of the Munich arsenal, he constructed a steel borer, and with this he operated on a brass cylinder. Fixing the borer into its position and forcing it down tightly against the cylinder, which was made to revolve by horse power, he soon observed the change in temperature which had before attracted his attention. The variation of temperature was registered by a thermometer. With this contrivance he found that in the space of thirty minutes the temperature of the cylinder was raised from sixty degrees to one hundred and thirty degrees Fahrenheit. But now, what brought about this change in the temperature of the metal under the friction of the brass with the steel auger? It was clear that there was a relation between the friction and the

amount of heat, but what was that relation, and how was it to be explained? It did not take Mr. Thompson long to perceive that the heat came out of, or rather was but a transformation of, the energy expended by the horse. In producing the revolution of the cylinder, force was expended by the horse. When the force expended was greater, as was the case when the friction was increased by bringing the metals into closer contact, it was found that the heat generated was greater, and *vice versa*. Guided in the proper direction by these experiments, Rumford was soon led to see that in the case before him force was changed into heat; that the energy expended by the horse was not lost, as had been supposed, but that it had all been conserved, and was now stored up in the form of heat in the brass cylinder. By further experiments it was easily shown that this heat could be again changed back into dynamic or motive force; and though Rumford did not know the mighty bearing of his discovery, yet to him belongs the honor of first establishing a principle which has since, in a large measure, revolutionized the world of scientific thought. From that day to ours the advance has been prodigious.

The principle discovered by Rumford, and worked out to its present perfection by such men as Joule, Grove, Mayer, Faraday, Helmholtz and Liebig has now become an established dogma of science known as the principle of "the correlation and conservation of forces."

At this point it is important that we should understand precisely what is meant by the phrase "correlation and conservation," as well as observe in how far these principles may lay claim to the dignity of scientific laws. By the term "conservation" is meant, in simple language, this: the indestructability of any force. We mean by it that no force is annihilated; that when it is, as we say, expended, it has not ceased to be; not gone out of existence, but remains as a factor in the universe, though it may exist in altogether another form.

As no atom of matter can be destroyed, so neither can any particle of force. Now, it was long before this fact was recognized; it was supposed that when a force was expended, as we call it, that it ceased from thenceforth to be, and that if its place was ever again to be filled, it must be by the creation of some new force.

When, for instance, a projectile shot from a

cannon fell to the earth under the law of gravity, or encountered resistance that destroyed its motion, it was supposed that the force which it represented was forever lost. That when the arrow had reached its goal the force that had propelled it in its flight was annihilated. It took a long time to understand that if this were true, some hidden laboratory in which force is manufactured must be kept constantly in operation to supply the place of that which is being constantly expended. But by and by, however, it came to be asked what becomes of these forces when they are, as we say, expended? And may it not indeed be that they are in some way conserved — stored up, perhaps, in some other form? Might it not be that the heat produced by the contact of the cannon ball with the resisting medium, and the heat of the anvil under the repeated strokes of the blacksmith's hammer be but expended force, though now in another form? Might it not be that the disturbance of the ether particles, as the projectile shot through them, is but carried to other entities, and from them again to still others, so that no force is really lost?

Well, these questions are now satisfactorily

settled. No doctrine of science is more clearly established than that force, once in existence, is never annihilated. But when this was established, the other principle, namely, that of correlation, was also fixed. It was found that no body could be heated without some other body being correspondingly cooled; that one mode of force could not be produced without exhausting another in an equivalent ratio. To this principle was applied the term correlation, and by it was meant, that when a force existed in one mode, it ceased to exist in the mode immediately preceding, and that the second mode was generated at the expense of the first, the third at the expense of the second, and so on. But, after all, the terms correlation and conservation express facts that are much the same; for experience proves that if forces are conserved they must also be correlated, and if correlated they must also be conserved. Perhaps it would be better to say that the one expression states or refers to the fact, and the other to the method. And now let us go out into nature, and see whether we can prove our principles of correlation and conservation to be true.

In speaking of force in relation to its power

to do work, it has become necessary to use two terms: kinetic and potential. A ball, for instance, projected from a piece of ordnance is capable, as we say, of performing execution. By that we mean that its energy is operative energy, or the energy of motion; and its power to accomplish work is measured as half the product of the moving mass into the square of the velocity. Force as thus measured is called kinetic energy. But there is another kind of energy which has also power to do work if allowed to. This is called, by way of distinction, potential energy. It is the energy that the rock possesses when it rests in an elevated position; for, to demonstrate the presence of force in this case, you have only to remove whatever obstruction there my be — let it fall to the earth — and its latent force is at once given out. But now observe not alone how energy is conserved, but also how one kind of energy is capable of being transformed into another, or, as it is called, conserved.

Take the illustration given by Stuart and Tait. A cannon ball is fired upward into the air. Against the force of gravity, such a ball, as it mounts, will each moment lose a portion of its velocity, until

it finally comes to a standstill; after which it will begin to descend. When it is just turning it is perfectly harmless. "And if we were stationed on the top of the cliff to which it had just reached, we might, without danger, catch it in our arms and lodge it on the cliff. Its energy has apparently disappeared. Let us, however, see whether this is really true or not.

"It was fired up at us, let us say, by a foe at the bottom of the cliff, and the thought occurs to us to drop it down upon him again, which we do with success, for he is smashed to pieces by the ball. In truth, dynamics informs us that such a ball will strike the ground with a velocity, and therefore with an energy, precisely equal to that with which it was originally projected upward. So likewise a pond of water, unless it has a fall, is of no use in driving a water-wheel. The head or the power of descending, gives it a store of dormant energy, which becomes active as the water descends."

Now observe here the operation of our principles of correlation and conservation. It would at first thought have been supposed that when the cannon ball had reached the top of the cliff, its

energy was lost, annihilated; but not so. The energy expended in projecting it upward is stored up, or rather changed into potential energy; and all that you need to do to call it out again, is simply to drop it, and by the time it reaches the earth its force is the same practically that it was the moment it left the mouth of the cannon. So with the water of the pond on the hillside. It would appear that the force expended by the sun in lifting its water to this elevated position when it was taken up in the form of vapor, was lost. But liberate the water; let it rush down the hillside; and as it erodes the soil and sweeps all before it, you see that the power expended by the sun in lifting it was not lost, but only stored up in the form of potential force. And thus in these two cases you see the law of conservation. But observe also the operation of our other law, namely, that of correlation. As the cannon ball was mounting upward, its kinetic force was being gradually transformed into potential, until at the moment the uppermost limit was reached, its kinetic was entirely transformed into, and existed alone as potential force. But the moment the ball began to descend, its potential was again

changed back into kinetic; and thus do we find our principle of correlation also operative. But notice still further the operation of our principles; when the ball reaches the earth with the velocity acquired in the descent, what, then, becomes of its energy? Has it not now been lost? Let us see: the moment the ball strikes the earth, as the result of impact, heat is produced.

Just as when the blacksmith strikes his hammer on the anvil, and the temperature of the metal is raised as the result of impact, so when our ball reaches the earth its temperature, as well as that of the earth on which it falls, is suddenly raised; that is, heat is produced. Now we learned when speaking of the experiment of Rumford, that heat was proven to be a mode of force; that it was the dynamic force of the horse transformed into heat force in the cylinder. So when the descending ball impinges on the earth, its kinetic force is immediately transformed into heat force, and can be changed back again from heat force into that of dynamic. It is true that in the case before us all of the dynamic force of the ball is not transformed into heat, but it is not on that account lost. The falling ball has influenced the earth —

moved it out of its course in a certain ratio, and in this way has the force been perpetuated.

But to come back to the heat produced at the moment of contact of the ball with the earth. Let us see how that, though its energy in a large measure was transformed into heat, the force of the descending ball was still conserved. It is universally known that heat expands metals. If you take an iron bar, measure its length at a certain temperature, say of thirty-two degrees Fahrenheit, and then measure it again after it has been heated to a temperature say of three hundred degrees Fahrenheit, it will be found to have expanded. The force of this expansion is practically unlimited. If the bar is free to extend itself, its force will of course not be observed; but if by some mechanical appliance you should endeavor to resist the force of expansion, you would get some idea of its power. And so, if we could by some means measure the force of expansion caused by the heat produced by the cannon-ball at the moment of impact with the earth, we should find that the dynamic force of expansion in the metal ball, plus that of the earth, would be practically equal to the force of the descending ball.

Now, see what we have here: First, we have the kinetic force of the ball as it mounts upward; we then have this force changed into an equivalent of potential force when the ball has reached its highest limit; we then have this potential force changed back again into kinetic force, which at the moment of impact with the earth, is equal to the force with which it was originally discharged. At the moment of impact we have kinetic force changed into its equivalent of heat force, and lastly this heat force changed into the force of expansion, or, what is the same, potential force. And thus we might go on tracing some particular force through its various modes back and forth, hither and thither, until however skeptical we might have been at the start, we should at last come to a firm faith in the integrity of the principles of correlation and conservation.

Now, by the process just pursued in our examination of motion and of heat, we may also be convinced that electricity too is but one out of many modes of force; a force brought out of some previously existing mode, and capable of being resolved into any other force, such as heat, motion, light, etc. To one who has kept pace with the

progress of inventions, and taken the care to study into their methods of application, this will be apparent. For illuminating purposes, electricity has now come into practical use. But whence comes the light that emanates in such dazzling brilliancy from the carbon point, or the arc, as the case may be? We say it is produced by the electric current; but what produces the current?

Follow one of those wires to its starting-point and you will be let into the secret. There is a steam engine; as its wheels revolve, they communicate motion to two bobbins, which, revolving at a high rate of speed in close proximity to the poles of a powerful magnet, produce a current of electricity which with proper mechanical appliances gives us the electric light. Now, in this operation you have four modes of force; heat, motion, electricity and light. The force of heat in the fuel is first transformed into that of motion; that of motion into that of electricity, and this again into that of light. In each step the correlation appears, and each successive force is but a transformation of the one that preceded it. Each force exhausts its predecessor, and takes up into its own form of energy the energy of its predecessor.

Now it may indeed be true that in the successive steps the conservation of force may not be clearly demonstrated. That is, the force of electricity may not be the exact equivalent of the dynamic force expended by the engine, or the force of motion may not be the exact equivalent of the expended heat force; in other words, we cannot say, strictly speaking, that one force is definitely and equivalently convertible into another. But it must not be forgotten that the initial force has not been lost even in the slightest degree, though it may have been dissipated into other forces of which no account has been taken. Thus, part of the heat force may have gone out into the air, part of it into the machinery; part of the dynamic force of the steam may have been taken up in overcoming friction in the machinery, and so, while the exact equivalent of the original force may never practically be reached in the transference of one mode into that of another, yet if the dissipated energy invariably incident to the converting of forces could be measured, it would be found that no particle of force has been lost or annihilated, though but part of it may have been converted into the new mode.

But we will not dwell longer in illustrating our principles of correlation and conservation ; we take it for granted that they already are sufficiently understood. By the same process it might easily be shown that our principles apply to the physical forces of plants and animals, as well as to those forces of the inorganic world which we have just considered. But our aim has, perhaps, already been attained, which was to show that, strictly speaking, the forces present in the universe are not of various kinds; on the contrary what are commonly regarded as different forces are to be reckoned as but different modes of the one something. Just as the player in the theatre may personate different characters, assume different costumes, and yet remain the same person, so may this something we call force assume different rôles, passing from one mode to another without being lost or annihilated. And thus the store of force with which the universe was at its beginning endowed, remains constantly the same, undiminished by the slightest amount, and will go on in its changes and evolutions, restoring at the last the precise number and value of the talents originally intrusted.

But we come now to the more important phase of our subject, and to inquire, Whence comes force? What is its origin? We can trace it as under its changing forms it seemingly endeavors to elude pursuit; we can prove its identity as here it appears in heat, there in motion, or here again in electricity, but can we not go further, and come to know something as to the nature, or perhaps even as to the origin of force? Let us make the attempt. If our principles of conservation and correlation hold, we must not look for the origin of force in time; that is, in the present order of things. For if forces were constantly being produced in nature, and if, as we have seen, no force once in existence is annihilated, we should have the anomaly of constantly increasing force, which would invalidate our principle of correlation; for this principle requires that every new mode of force shall come from the exhaustion of some force previously existing. For instance, when motion is produced from heat, heat-force is simply transformed into that of motion. Prof. Helmholtz, in his demonstration of the impossibility of perpetual motion, has clearly proven this to be true, and, at the same time, shown that one mode of

force exists but at the expense of another. If this were not true, and if new forces could be created or developed without the exhaustion of others, then would perpetual motion be possible. But, if our principle of correlation holds (and not a single fact can be produced to invalidate it), then must we look in vain for any new force as being developed out of the material world.

The modern statement of the principle of correlation is, according to the author of the "Unseen Universe," briefly this : "In any system of bodies whatever, to which no energy is communicated by external bodies, and which parts with no energy to external bodies, the sum of the various potential and kinetic energies remains forever unaltered."

In other words, while one form of energy becomes changed into another, each change represents at once a creation of one kind of energy, and a simultaneous and equal annihilation of another, the total energy present remaining forever unaltered. It is then at least certain that matter cannot create force, and that from no laboratory in which the mere natural is brought into relation, can force come as a product. Outside, then, of the material world, must we look for the origin of

force. Nor can it be said that force itself is matter in any of its forms. The fallacy of such a notion was long since exposed by the illustrious Mayer, in his work on Force. Force may act on matter: it may likewise change the form of the material; may hold its parts together by cohesion, chemical affinity, or gravity; may operate with it as the moulder operates with the clay; may lift ponderous masses from the earth, and toss them with the ease that a boy tosses his ball into the air; but force ever remains apart and distinct from that upon which it operates.

But here, as the result of what we have just been considering, the question may come, Does force exist apart from matter? Can it be said to have an existence apart from the material, so that if matter were to be destroyed, force would not be destroyed? So intimately are matter and force united, that it has come to be believed by many that an essential relation exists between the two; a relation so intimate that one could not continue to be without the other. By some matter has been defined as the seat or vehicle of energy; implying that without matter force could have no existence. Now, if it be denied that anything exists save

that which may be apprehended by the sense, and as it is apprehended by the sense, then force may not exist apart from matter. But against such a limitation of our knowledge the common consciousness of humanity protests. The fact that two things, so far as the testimony of the sense goes, always are found associated, is no proof that they are essentially one, or that they cannot exist apart. To insist on such a doctrine would not only be to break down the most inspiring hopes of mankind, but to stultify the universal consciousness of humanity.

That no one, guided simply by the testimony of the sense, could say that the soul and the body are not essentially one, is apparent. We have no sense faculty that can get between and differentiate the two. We have never seen them separated, and we have no empyrical proof that they can be. But not simply as a revolt from the grim consequences of admitting their essential unity and dependence, but, as the necessary outcome of all true thinking, we have come to regard them as essentially separate; one as material, the other as immaterial, though in the present order of things always found together. And so it comes to be at

least thinkable, that force may exist apart from matter, though so far as experience goes they are always associated. The oversight on the part of those who maintain that force may not exist apart from matter is this: that apart from matter it cannot be apprehended by the sense; it is alone as force operates on matter that it can appeal to the sense, for by the sense we can know the material alone. But we are not left thus to reason out the possibility of the separate existence of force. We know that at certain moments its existence must be separate. From the first we have spoken of the force of the sun as operating on the earth. Now what had we there? On the one hand an immense mass of matter called the sun; on the other, our globe made up of matter also. But these immense masses of matter are separated from each other about ninety-five million of miles.

Associated with the material of the sun are prodigious forces. How did these happen to affect our world? For unquestionably these same forces, originally existing and operating in the sun, are now present in the earth in the form of life, heat, etc. But why are they here? There was a time when they existed in association with the

matter of the sun; they are now associated with the matter of the earth. Therefore there must have been a stage in which the force, having left the sun, had not yet reached the earth; a period, the duration of which we cannot estimate, but which must certainly have been of considerable duration, when the force was to be associated with neither the sun nor the earth, but *en route*. During that period, however long or short, energy must have existed disassociated from matter, and had an existence as simple force.

The same is true whenever force passes from one body to another; during the time of its passage it cannot be conceived as associated with matter as we know matter, but exists as free, pure force. And so, while apart from matter we may not be able to demonstrate its presence in any particular place any more than the beam of light may be seen apart from the dust particles afloat in the air of the room, yet it is plain that it must exist in some form during the period of transition or it could not reveal itself again in the one after it had left the other. We are aware that to this it may be replied, that the ether itself is matter, and hence force *en route* is never for a moment really disas-

sociated from matter, but co-exists with the matter particles of the ether. Now we have no disposition to discuss this point at length. It is clear at a glance that if the ether is matter, then it is matter from which everything which we have come to regard as characteristic of the material, has been eliminated. A material through which a body like the earth, surrounded by an atmosphere, at a velocity of a hundred thousand feet per second, can pass without resistance, and without even loosing its atmospheric envelop, is simply inconceivable. And yet no fact in physical astronomy is more clearly established than that the earth does this, and that the resistance of the ether to the earth, in spite of its immense velocity, is in reality nothing. Moreover, however attenuated the matter of the ether might be, it cannot be conceived how even a gaseous body like that of a comet, shooting through the spaces at a rate surpassing a thousand times that of a cannon ball, could pass without being dissipated or even retarded in the slightest degree. For if matter, however minutely divided, must offer resistance, even though that resistance may decrease as the subdivision goes on, and matter becomes more and

more attenuated, there cannot come a point when resistance will be zero. If matter be present at all, the zero point will be arrived at the moment that all matter as we know it is eliminated, and not a moment before. But when the zero point is once reached, and resistance is nothing, then is matter as we know it necessarily absent.

But we may go further than that. It has come to be an axiom of Science that energy becomes more and more marked as the grosser material is eliminated. You may start, for instance, with some form of matter, come up from one grade of the material to another still more subtle, and at each step, instead of energy growing less as you recede from the grosser to the more subtle, it becomes, on the contrary, greater and more active. Thus if a point could be reached at which matter would be completely eliminated, that point would be the point of pure energy. And thus it becomes no longer a question whether force can exist apart from matter, as we know matter; indeed it would be more to the point to ask whether matter can exist apart from force, than to ask whether force can exist apart from matter. If force passes from world to world, as it certainly

does across immeasurable spaces, then, during the period of its passage, its existence is an existence apart from the material. And if it be true, as Science teaches, that energy in the universe becomes greater as we get further and further from the mere material, and approach nearer and nearer the immaterial, then it becomes well-nigh certain that when the realm of the immaterial is once reached, force instead of ceasing to be, would but become pure in its character and perfectly active in its operations. It may therefore be affirmed that while matter and force in the present order of things are intimately associated, they are by no means inseparable; may even in the present universe exist apart, and that the origin of force is not to be found in the material. Back of matter, prior in time to the history of the present material universe are we driven in our search for the origin of force. We must find it, if we find it at all, in the immaterial, the unseen.

But as matter cannot generate energy, so neither can life. The idea that life can generate energy has long been abandoned. Life is energy. To say, therefore, that energy is produced by life would be simply to affirm that force is produced

by force, and thus to reason in a circle. But now observe to what we have come. In our search for the origin of this something called force, we traverse the fields of the material and the living in vain. Ask where are the secret springs of forces that are ever playing in the universe, and the answer that comes from matter is, they are not in me. Life too answers they are not in me. Even time answers they are not in me.

And now we may venture to ask, May not that profound investigator, W. R. Grove, who with keen insight and unsurpassed skill, pushed his investigations to the uttermost scientific limits, may he not have been right, when he said, "causation is the will, creation the act of God"? May Carpenter not have been right when he said, "The convertibility of the physical forces, the correlation of these with the vital, and the intimacy of that nexus between mental and bodily activity, which, explain it as we may, cannot be denied, all lead upward towards one and the same conclusion, the source of all power in mind; and that philosophical conclusion is the apex of a pyramid which has its foundation in the primitive instincts of humanity"?

But having looked in vain for the origin of force

in the material, having looked in vain for it in the realm of the living, there yet remains another field open to our search. Before we come to it, however, let us note one thing: the better we come to know force, the more does it assume the nature of something guided by intelligence; in other words, the more we know of it the more do we suspect its voluntary origin. It is gradually coming to be settled that force as it works unhindered in the universe is not blind, but that it ever works to a rational end. It is because this fact has been persistently overlooked, that many of its operations have gone unexplained. Hitherto it has been demanded in scientific discussion that no fact shall be explained by the introduction of a factor outside the merely natural. On this principle many have worked in their interpretation of the facts of force, but with the most unsatisfactory results. Theory after theory has been advanced, but no single one as yet has been adequate to the task of explaining all the facts. That force refuses to be thus interpreted is attested by the fact that, after a century of theorizing, we have even now no theory that can explain either the forces of life or gravity; the very forces which of all have been

most carefully studied. Until Science is willing to lift her eyes above the merely natural, she must fail in every attempt to account for the most common facts of force.

But a new day has already begun to dawn. It has come to be understood that no hypothesis built alone on the material can account in any manner for the operations of vital forces; and equally frank is becoming the admission that the most plausible theory of gravitation hitherto advanced from the materialistic side, namely, that of Le Sage, will neither account for the facts, nor is yet consistent with common sense. The tendency now in science is to the recognition of an intelligent principle back of and as directing force in its operations.

In his Outlines of Astronomy, Sir John Herschel does not hesitate to say, "It is reasonable to regard the force of gravitation as the direct or indirect result of a consciousness or will exerted somewhere."

In a recent lecture delivered in New York, by Professor C. A. Young, the astronomer of Princeton College, you find these words: "How it is that one atom of matter can attract another atom,

no matter how great the distance, no matter what intervening substances there may be; how it will act upon it, or at least behave as if it acted on it, I do not know, I cannot tell. Whether they are pushed together by means of an intervening ether, or what is their action, I cannot understand. It stands with me along with the fact that when I will that my arm shall rise, it rises. It is inscrutable; all the explanations that have been given of it seem to me merely to darken counsel with words and no meaning. They do not remove the difficulty at all. If I were to say what I really believe, it would be that the motion of the spheres of the material universe stand in some such relation to Him in whom all things exist, the ever-present and omnipotent God, that the motion of my body does to my will."

That is a remarkable statement, and all the more so as coming from one prominent in the ranks of those who have hitherto protested against the introduction of a higher factor in explanation of existing facts. But not less noticeable are the words of Lionel S. Beale in regard to the forces of life. Watching the cell through the tube of his microscope, with an experience and skill

unsurpassed by any investigator in his department, and impelled also to account in some way for the facts observed, these are his words: "Over and over again, cells have been compared with laboratories; but the chemist in these cell laboratories has been ignored; and with machines, the constructor of which, as well as the engineer and manager, has been entirely left out of consideration." "Authority may continue to refuse to admit, or may deem it expedient to deny that the living state differs absolutely and entirely from the non-living condition, but the truth remains that in the living state of matter, whether it be the living matter of a growing fungus, or that concerned in mental action, material forces and properties are somehow governed and controlled, and in a manner not to be imitated by us, or to be explained by anything known concerning non-living matter, while it is incontestable that the moment the matter ceases to live, its capacity for manifesting its ordinary properties returns; in fact, in all life we must admit the operation of a power or influence far removed from the physical category. This psychical factor has never been explained away, and is the life of every living thing."

And thus it is coming to be admitted that, in order to explain the two modes of force, namely, that of gravity and that of life, a higher factor than the merely physical must be introduced, as well as that force is somehow affected and controlled by, if it is not indeed the outcome of, intelligence.

And now the results of these admissions are at once apparent. If these two modes of force, the one in the realm of the material, the other in the realm of the vital, are to be accounted for alone on the assumption of an underlying intelligent principle, then may all modes be accounted for in the same manner. For introduce into the universe these two modes of energy as initial, admit them to have come out of intelligence, and then, according to the principle of correlation, every mode may have been evolved from them. Let gravity be the initial force in the realm of the non-living, and out of it, as we have learned, will come motion, heat, electricity, light, and the entire category of physical forces. Let life in its simplest form be once introduced, and out of it can come every vital force operating in the organic world. Fix your attention on that. If gravity and life have

their origin not in the material, but the intelligent; if these two forces in the statement of Herschel are to be traced as the result directly or indirectly of "will exerted somewhere" — if that can be made out; if there is a force in the universe with which gravity and life stand correlated, and which is itself correlated but on the one side, and if that force is intelligent, then may every mode of force be traced, in respect of its origin, directly to the immaterial, the spiritual, the intelligent.

It is therefore more than a presumption that in the last analysis all force must be resolved into voluntary energy, and the strength of our proposition, that "force is voluntary energy directly or indirectly applied," is made to appear. But we have one point yet to examine.

We have just seen that force in its operations, when thoroughly studied, compels the admission of intelligence back of it; and that the motions of the planetary bodies, as well as those of the cell, have their nearest parallel in the motions of the human body under the control of will. From this there is but a step to our proposition. Before we take it, however, one thing must concern us; we must ask, —

Does voluntary energy meet the requirements demanded by the idea of an original force? It may be that voluntary energy itself stands in correlation with some previously existing force; perhaps when brought under inspection it is not of itself original. In our search we cannot stop short of the ultimate.

Now the idea of an original force demands that such strength shall be underived; that is, that its energy shall somehow be self-developed; imparting, but not receiving, or, in other words, correlated but on the one side. Any force claiming to be original must fully satisfy these requirements. And so it is necessary to ask, Have we such a force in will? Is not its energy to be traced to some other mode? If these facts can be established, then is it original, ultimate.

In coming to the solution of this question one thing must not be overlooked, and that is, that will, as we here know it, is by no means what it must be in its normal existence. It is a question whether it is absolutely unconditioned even by its material environments, and yet we cannot, even with its present surroundings, speak of it but as free, and as virtually unconditioned. What will

must be, in the person of Him who is the absolutely unconditioned, we do not know, we cannot tell. It is different at least from ours, and yet, environed as the human will is, its energy is the only original energy known to us. Of it alone can it be said, It speaks, and it is done; it commands, and it stands fast. Take, if you please, some piece of mechanism to which motion has been imparted by human power — let it for example be a clock. You may trace the motion of one part to another, and this to still another, throughout the entire series, from the pendulum to the mainspring; and as you do so, you have an illustration, on a small scale, of the principles of correlation and conservation. Begin with the force farthest removed from the central one — the mainspring. Start with the motion of the pendulum, as, swinging back and forth, it measures the flying seconds.

Here you have a force; but you can, according to the principle of transmutation of energy, trace the force expressed in the motion of the pendulum to the force of the escapement wheel; this to the next wheel in the system, and so on till you come to the spring, the original force in the mechanism.

But when you come to the spring you have not yet reached the limit. The force exerted by the spring is but the equivalent of a certain amount of muscular energy expended in the winding. Your muscular energy may be traced again to nervous force; this nervous force again to the displacement or motion of certain particles of the brain, and, finally, the motion of these brain particles may be traced to the will. But observe that you have now reached the ultimate. Back of the will you cannot go. You cannot take another step in the regressus; the will is the ultimate.

And so it is seen that among the known forces in the universe, voluntary energy alone can lay claim to being original. Every other known force may be traced to some other force preceding, but back of energy in volition we cannot go.

And now what are the conclusions to which we are inevitably led? If analogy counts for anything, then may it not be said that in will as we know it, operating as it does, not alone in controlling, but also in imparting motion to the body, and through the body — putting into the world new and original forces — may we not say that

in this we have a fact in the light of which the universe may be interpreted? And may it not with certainty be affirmed that every force, from those that control the atom, on up to those which drive the planets in their fiery orbits with resistless might, are but the emanations of a supreme will exerted in the beginning? Aside from energy in volition, there is no original force known to us. It alone satisfies the idea, in that it comes from no pre-existing mode. It alone imparts, but receives not, the only factor that can put a power into the endless cycle of forces that shall go on into the eternities, yet itself remaining outside the cycle, its energy underived, unconditioned, ultimate.

And now go out into the universe with this conception of force as coming out of intelligence; sit with Herschel, and Newton, and Kepler, and Tycho Brahe; watch the mustering squadrons of suns and moons and stars as, in fiery armor, obedient to the laws of nature, they march on in grand review. Sit with Heinrich Frey and Lionel Beale before the cell as it builds the wondrous fabric of nerve and fiber and muscle, in conformity to plan, and nature will no longer be inexplicable. Back

of force in planetary and cell movement there will be found will. Back of will, a Person; He who was, and is, and is to come.

"He whose presence bright
All space doth occupy, all motion guide
Unchanged through times all-devastating flight,
Mighty One.
Whom none can comprehend, and none explore,
Who fill'st existence with thyself alone
Embracing all, supporting, ruling o'er,
Being whom we call God, and know no more."

# MIND.

"The doctrine of the materialists was always, even in my youth, a cold, heavy, dull and insupportable doctrine to me, and necessarily tending to Atheism. When I had heard with disgust, in the dissecting rooms, the plan of the physiologist, of the gradual accretion of matter and its becoming endowed with irritability, ripening into sensibility, and acquiring such organs as were necessary, by its own inherent forces, and at last rising into intellectual existence, a walk into the green fields or woods, by the banks of the river, brought back my feelings from nature to God." — Sir Humphry Davy. "Consolations in Travel," p. 206.

"We are led by a scientific logic to an unseen, and by scientific analogy to the spirituality of this unseen. In fine, our conclusion is, that the visible universe has been developed by an intelligence resident in the unseen." — "Unseen Universe," p. 223.

# MIND.

About the time that Jesus was born in Bethlehem of Judea, there flourished an illustrious poet and philosopher, Titus Carus Lucretius. He came upon times when corruption had penetrated every fiber and vein of the national life, when extravagance and lust rioted in the heart of society, and when the whole system of national and social life was cancerous to the very core. Amid the outrages of that awful epoch life had lost its power to charm, and suicide, glorified by the stoics, was recommended as the surest refuge against the vice and despairing misery of the times. But while life had become a burden, and death was to be chosen as a relief from life's misery, "the dread of something after death" made men cling to an existence that was scarcely to be endured.

It was but natural that out of such times there should come a characteristic philosophy, or rather, that the thinking out of which the disordered state sprang, should take form in a philosophic system.

To the keen mind of Lucretius, it was obvious that the dread of the unseen, into which men haunted by a guilty conscience feared to go, was brought about by the belief in the gods, "the avenging deities" that took account of the sinful deeds of the present life, and who, in a future one, would certainly institute a reckoning. But since this fear was what kept men chained to an existence from which they longed to be free, it became important that it be dissolved, and that the belief in the gods, out of which it evidently came, be demonstrated as groundless.

It was to this task that Lucretius came. He aimed to show the emptiness of all belief in an over-intelligence as concerned in the affairs of the world and men, and ascribed all things to natural causes. With him the universe found its explanation in the "primitive atom." In the rock, the unyielding iron, and the denser bodies, the material atoms out of which, according to his system, the universe was built, stood in close contact. In the air, the ether, in the sunlight and gases, these atoms were less closely related; and thus in the universe without, the atom and its relations were made to account for all, and mind, spirit, the

gods, could not be. But while with his atoms which he made the cause and explanation of all things, Lucretius dissolved the gods, leaving nothing in the outer universe but matter, there still remained a fact for which he had to account — it was the fact of mind within. Of a mind without men could not be so certain. True, they thought they saw its evidences in the world about them; they thought they heard, in seasons of reflection, the mind without speaking to the mind within, but of this they had no absolute proof: it might and it might not be. But of mind within they were certain; men knew that they thought. They felt that thought was not, and could not be, matter, and so, while the material atom might be made to account for all that was without, it could not so well account for that which went on within — it could not account for mind out of which thought sprang. They saw, too, that if all was not matter within, then all might not be matter without; and that if mind lived in man it might live out of man; might be back of nature, and thus, after all, be in the universe. And so Lucretius had to readjust his system; had to go further perhaps than he had at first calculated. In short, he had to

explain mind as he had explained matter. And so he said that, like matter, mind was made up of atoms free to move among each other, and that the rapidity of mental operations was to be explained from the fact that the atoms concerned in thought were round and perfectly smooth, as well as small in size. And thus with Lucretius matter was deified that mind might be eliminated. With him the material was all. Those entities that we call mind and soul are born and perish with us; nothing is but "body and void."

As might have been predicted, the philosophy of Lucretius, created as it was for the avowed purpose of breaking down intelligence, thoughtful as it was in some of its features, came to naught in the very age in which he lived. A universe without intelligence could not satisfy the reason even in its simplest processes, and men saw that a system from which mind was ignored, or in which it was made to be but a phenomenon of matter, could lay no claim to being a true philosophy.

Lucretius, in regard to his theory, might have learned wisdom from his contemporary: "Far more easily will we be able to build a city in the air, than on earth to found a city without the gods."

And yet, strange as it may seem, in almost every age since Lucretius, men have worked upon the very problem over which he labored in vain ; have tried to demonstrate the solution of the universe in terms of matter, and, ignoring mind, have endeavored to account for being. It was to this that Locke, Hume, and afterwards the Mills, by methods peculiar to each, brought the wealth of their geniuses. Taken up in our own times by men like Spencer, Bain and others, with arguments drawn purely from the physiological field, the popular philosophy of to-day has come to be decidedly materialistic in its character. And so, while many have given themselves no concern as to the method by which these conclusions have been reached, or even asked whether they have been legitimately or illegitimately drawn from the facts, or indeed whether by such methods the facts themselves are to be at all explained, yet accept without further question the conclusions arrived at, and make such the basis of their mental and moral life.

It is our purpose in the present chapter, so far as our space will allow, to enter into an adverse criticism of this current philosophy that practically denies to mind a place as real being, and,

instead of asking whether matter and force cannot be made to account for all phenomena, to enter into an inquiry as to whether by these alone phenomena can be explained at all, and whether the true order is not first mind, and then matter; first mind as conditioning and determining, then matter as conditioned and determined. It will be apparent at a glance, that this problem is most intimately connected with the one that we attempted to solve in the previous chapter. Our aim there was to show that force was not to be traced to a material origin, but rather to a mental.

But what if, in the language of the current philosophy, mind itself is but matter? What if thought be but the product of the fibers and cells of the brain—a mere secretion, and nothing more? If this be true, if mind be nothing more than matter in some one of its forms, then must our position in regard to the beginning of force be abandoned, and all search for its origin becomes futile. Nor is this all; ignore mind as separate being by merging it into matter, and you have destroyed the possibility of all knowledge. Man is nothing, then, but an indefinite quantity upon which impressions may be made, but which to him have no more

meaning than the image has to the mirror upon which it falls. It becomes, therefore, a question of vital importance whether this gospel of matter, so characteristic of our times, has its foundation in fact, and whether matter is in reality all. We shall therefore enter into our present inquiry not alone in the interest of the view expressed in relation to force, but in the interest at once of morality, religion, philosophy, and, indeed, of every vital question with which we as men are to be concerned.

Our first task must be to ascertain the precise position at present held by the more advanced materialists. Their fundamental principle is, that nothing exists at all but matter.

That which we call mind is nothing but a function of the body; a necessary product of sensuous perception and the nutritive matter absorbed by us, but pre-eminently a product of the action of the cerebral portions of the brain. Mind is a product of the brain-development, just as the secretions are the product of the glands. Thought, in the language of Moleschott, consists in the motion of matter; it is a translocation of the cerebral substance; without phosphorus, there can be no

thought, and consciousness itself is nothing but an attribute of matter. Man, says Czolbe, is nothing more than a mosaic figure, made up of different atoms and mechanically combined in an elaborate shape. As heat and light are but modes of motion, so also is nervous activity. And if nervous activity is but matter in motion, so also is vital energy; and if vital energy is but matter, so also are mental judgments, so also is mind itself. It comes, therefore, to this: that all mental operations are but manifestations or expressions of material changes in the brain; that man is but a thinking machine, his mental life entirely determined for him by conditions over which he has no control. That this is what we are to understand as the position of materialists, is expressed in no uncertain terms in the correspondence between H. G. Atkinson and Harriet Martineau, in which are to be found sentences like the following: "Instinct, passion, thought, are effects of organic substances." "All causes are material causes; in material conditions I find the origin of all religions, all philosophies, all opinions, all virtues, all spiritual conditions and influences, in the same manner that I find the origin of all diseases and of all insanities in mate-

rial conditions and causes. I am what I am — a creature of circumstances; I claim neither merit nor demerit." "I feel that I am as completely the result of my nature and impelled to do what I do, as the needle to point to the pole or the puppet to move according as the string is pulled."

From these utterances it must be apparent that mental actions can be nothing more than the activity of matter; that mind itself is but matter conditioned and determined by its environment. To speak, therefore, of mind, is to speak of that which is not; matter is all.

Now before we go on we must stop to see out of what this materialistic conception of man has come. For in making up our estimate of any system we will always be aided by an inquiry into its history. If, from any reason, whether of prejudice or other cause, a full view of the field to be traversed has not been had, we may at once suspect that in the system there will appear some essential defect, which must nullify it as a true interpretation of that which it attempts to explain. In looking, therefore, into the history of this conception, we shall find its error to consist in a one-sided study of man; a study of him purely from the physiological side.

Its advocates are men eminent in the various departments of physical science. Men who have looked profoundly into nature, studied out her laws and methods, but who, according to their own acknowledgments, have given themselves no concern in regard to psychology. The dogma of evolution has taught them to regard man but as a higher order of the brute, and as such he must be experimented on, dissected, studied by the same methods. The microscope, the scalpel and the electrode are applied. Nerves are traced to their supposed centres, back again to the muscles; the electrode is applied; certain parts of the brain are touched, and certain motions follow. Hence it is assumed that nervous activity, like electricity, is but a mode of motion; stands, therefore, in correlation with other forces, and other modes of force may be changed into it. The conclusion thus has been arrived at, that if nervous activity is but a mode of motion, similar in every particular to any other mode, and governed by precisely the same laws, then, too, is vital energy; and if vital energy is but material, why, then, are not all mental phenomena — why not mind?

And thus for half a century men have been giv-

ing their attention to the study of brain tissue, in the hope of discovering the hidden connection between these tissues and thought, and of laying open the mysterious processes whereby the nutrient matter taken out of food may be transformed into energy, and this energy again transformed into thought. Without getting beyond matter, they have attempted to solve the problem of mind.

Well, now, with this history back of it, and in pursuance of these methods, materialism has come, bearing the marks of its one-sided process. Out of such a history, such and only such a philosophy could come; a philosophy dwarfed, half-developed, uncomprehensive. We have directed attention to the history and to the method, because thereby the system is explained as to its one-sidedness. Carlyle once said that, "It is not honest inquiry that makes anarchy, but it is error, insincerity and half-truths that make it." It is so with philosophy. To be a true system it must take into account all the facts, deal honestly with them, and explain them if possible; otherwise it becomes intolerant and altogether inadequate. Just as the idealism of Berkeley, which sought to explain all being in terms of mind, broke down because it

failed to be comprehensive in that it did not account for phenomena without us, so must this also be ruled out on the ground that it does not explain that which is within, or, if you please, because it fails to be comprehensive.

Mind is; matter is. Each is to be accounted for; neither is to be ignored nor explained in like terms with the other; both are revealed in consciousness, and as objects of consciousness are to be explained.

But before we go on to a criticism of this system, let us see precisely what we have to do. It affirms that nothing is but matter and its forces; that all phenomena are to be accounted for as being the result of the operation of these two factors. We have, therefore, to show that mere matter and force cannot be made to account for the facts as they exist, and that no explanation but that which gives to mind a place distinct from matter and as determining matter, can explain phenomena as they appear, or the facts of consciousness as they exist, for it must not be overlooked that the facts of our inner experience are as real as the facts revealed in the sense, and that mental phenomena are as real as material.

In determining, therefore, the validity of materialism, let us consider three propositions :

First, if matter alone is, diversity in human thought and action, the physical antecedents remaining the same, cannot be explained.

Second, if mind is matter and not an existence in itself, then is there nothing to which phenomena can appear, and phenomena cannot be interpreted.

Third, if mind exists not apart from matter and as undetermined by matter, the new in art, literature or invention could not be. Take, now, the first proposition :

If matter alone is, diversity in human thought and action, the physical antecedents remaining the same, cannot be explained. If there is any one fact that the study of matter and force has confirmed more than another, it is the immutability of their operations. Certain antecedents always precede certain consequents, and like effects invariably follow like causes. It is the persuasion that Nature is invariable in her operations, that makes a science of nature possible. If Nature were variable, if certain antecedents with unvarying certainty did not precede certain consequents, no man could know Nature or formulate her laws.

The sun rises to-day at his appointed place and time. The moon nightly drives her chariot through the sky along the same route she has journeyed since the morning of creation. Indeed, so unvarying is this uniformity that the very moment of her passage across the sun's disk may be foretold, the path of her shadow determined; and when the predicted moment comes, she has reached her appointed place in the heavens and proceeds to drag her train of darkness over continents and seas in the fulfillment of her promise.

The seasons, in obedience to well-determined laws, come and go. Day follows night, and night the day, while creation sings the same song she sang when the sons of God shouted for joy, and the morning stars first sang together. Take the principle of uniformity out of nature, and astronomy as a science could not exist. The same is true of chemistry. The chemist knows that two elements subject to the same conditions will always unite with like result; that certain causes always produce certain effects and no other, and that, given the cause, the effect is the same yesterday, to-day and forever. But rob the elements with which the chemist deals of this principle, of uniformity in

action, and chemistry as a science could not be. The union of two elements to-day would produce heat, to-morrow cold ; two other elements in union to-day would produce a liquid, to-morrow a solid. As much may be said of Nature in whatever department she is investigated. If Science is, it is because Nature is uniform ; because matter and force always act in certain ways, and can act in no other. But come now to man. In him, according to the dictum of materialism, nothing exists but force and matter, acting as they act elsewhere in the universe. But man is not uniform. Thoughts and acts are not uniform. Who can predict, if the antecedents be given, what the thought or the act may be ? Having once determined how a man will act under certain circumstances and conditions, no one can say that under precisely the same conditions he will act as he did before. Indeed, so variable is human action, under circumstances precisely identical, that the phrase, "The unexpected is what always happens," has passed into a proverb.

Now this lack of uniformity, the various courses pursued by different individuals, and, indeed, by the same individual under circumstances precisely

similar in character, cannot be explained if in man nothing exists but matter, and mind the product of matter is determined and conditioned by physical antecedents. There must, then, be uniformity in human actions; and the course that any one will pursue under given circumstances may be predicted with the same certainty that effects in the material world may be predicted when the antecedents are known. But that course cannot be predicted. And the only satisfactory explanation of this lack of uniformity in human action is found in the admission that in man there resides that which is undetermined and unconditioned: something that determines a course of action purely out of itself, and that recognizes no conditions but those of its own being. Moreover, in all our attempts to influence or to determine beforehand a course of action for our fellow men, we recognize the truth that they have power to overstep all physical antecedents, and are able to act as though such antecedents were not existing. And thus, instead of bringing physical causes alone to bear, instead, for instance, of studying the influence of air and diet and the like, we aim to determine the action, not by the physical, but by

bringing into operation influences as far removed from the physical as can well be.

And thus do we recognize that the controlling factors in human action are not matter and force, but that which has power to determine even these. And that in man not matter, but mind, is the controlling factor; that motives are stronger than material forces, and that these determine for us a course of action in the very face of all physical antecedents. This is the method of all civilization and reform. Not the determining of mind through matter or material conditions, but the determining of material conditions through and by means of mind.

And then, again, if there be nothing of us but matter under control of the same laws that govern matter in the world without us, it follows not only that actions with certain antecedents must be uniform — the same physical cause always producing the same effects in thought and action — but also that such effects must follow immediately on the cause. There could never be such a thing as deferred action. It is because effects follow immediately on the presence of the cause, that we are able to affirm their connection or trace any certain effect to a certain definite cause.

If the two phenomena did not co-exist, no man could affirm of a certain effect that it sprang from a certain cause. It is the close relationship in time of the two phenomena of cause and effect that enables us to affirm their connection. The moment the bolt leaps from the cloud, the tree is shivered into fragments. The moment the electric current touches the steel, it becomes magnetized. The moment I touch, inadvertently, a heated surface, the nerves concerned in automatic action cause the proper muscles to contract, and my hand is withdrawn. And thus it is wherever matter and force alone enter as factors. Well, now, grant that thoughts, grant that actions are effects of material changes in the substance of the brain, and that when these changes take place the thought and the act follow as the necessary effect of such change, and how, then, are you to explain deferred action? How are you to explain the fact that to-day you may determine to do a certain thing, and yet say to yourself, "I will not do this thing to-day, I will wait until to-morrow"? How account for the fact that you may even appoint an hour, and say, "I will do it then"? By that time other changes have taken place in

the brain structure which, on this principle, would impel you to do the very opposite of that upon which you had determined. But yet, faithful to your determination, you do precisely the thing that you determined to do, and at the precise moment appointed. Now, we insist upon it that this could not be, if action and thought were caused and determined alone by changes in the brain structure, and followed as the necessary effect of such changes. If that were the case, the effect would be immediate, if at all, and we could no more defer the action than we can defer the effect of the lightning, or hold back for a definite period, the explosion of the projectile from the cannon after the powder has been exploded. It is therefore evident that if we would consistently explain the facts, we must go beyond matter and force; in short, must acknowledge the presence and potency in man of that which is above matter, and undetermined by it. If actions, the physical antecedents of which are the same, may be diverse, and if the outgrowing of such action may be deferred, it follows that the cause of such action lies not in matter, but in that which is above matter and independent of it — that is in mind.

But come now to the second proposition: If mind is matter, and not an existence in itself, then is there nothing to which phenomena can appear, and phenomena cannot be interpreted.

It was because the truth involved in this proposition was overlooked by Locke, that his system went asunder. The same truth is alike fatal to all sensuous philosophy. In every such system the fact is overlooked that it is mind that makes phenomena possible, and that until you have mind, you cannot have a phenomenal world. And yet men who advocate a purely sensuous philosophy are fond of talking of impressions and appearances. They speak of mind as "a sheet of blank paper"; "a clean tablet on which impressions are made by the sense." But the significant truth is overlooked, that when impressions are made on the paper or tablet they remain as simple impressions: they do not come to be ideas; they never become knowledge. In man impressions become more than impressions: they become ideas; in reflection united in one idea of substance, they become knowledge.

To the mind, impressions are not what they are to the tablet; the same is true of all phenomena.

Before appearances can appear, there must be that to which they appear. We say phenomena appear. Very well; but to what do appearances appear? The reply must be, "They appear to the mind." But remember, now, that mind, according to this system, is matter, and matter is phenomena. Can phenomena appear to phenomena? and if so, how are we to explain the fact that fleeting impressions are constructed, put together in an idea of substance and thus become knowledge? Knowledge is not appearance; knowledge is not phenomena. Impressions may be made on a sensitive medium as they are on the sensorium. Images may be formed on the mirror as they are on the human retina, but there they remain; they never become more than impressions. The mirror cannot know the object that appears; the sensitive medium cannot interpret the impression, and, in either case, knowledge as such cannot be. And why? The answer is, These are mere matter, because back of the impression there is nothing to interpret the impression; nothing that has power to get out of fleeting impressions knowledge. There is nothing to which appearances appear. It is not so in man. Back of the appearance stands

that to which appearances appear. In him there is that which has power to reflect upon the impressions as given in the sense, that looks upon the image as formed upon the retina, that interprets impression and image, and gets out of them knowledge. What, then, is this something back of phenomena that looks upon and interprets them? Matter it cannot be. Mind, apart from matter, it must be. Remove mind and you have nothing left to which phenomena can appear, for it is by mind that phenomena are made possible, and until you have mind as existence, apart from matter, you cannot have a phenomenal world. And if even such a world could be, it could not possibly be known or understood by us.

But again: it is alone as mind stands apart from matter and as unconditioned by it, that the new in art, literature or invention becomes possible. On no other condition is the new possible. Otherwise, to know one individual of a race or a country would be to know all. To know what man has wrought and been would be to know what he may do and be throughout all ages. See how this is. The product of mere material agencies is unvariable; the characteristic foliage of the tree is ever

the same; the flower of the individual plant in a state of nature is from year to year the same. This holds whenever mere matter and force are the factors in the problem, and in that case we look in vain for the new. The principles of correlation and conservation of forces in the material world required that no new force shall come into action. But put this law relating to force side by side with that principle upon which all science rests, and without which no science could be, namely, that forces act, and must act as they have always acted hitherto, and what have you? This: that nothing new can come. Remember, now, that thought, according to the theory which we are discussing, and mind out of which thought comes, are but matter and force operating as they have always operated, and I ask, How are you to interpret a Milton or a Shakespeare in literature, a Locke or a Kant in philosophy, a Raphael or a Michael Angelo in art, a Mozart in music, or a Fulton in invention? Ignore mind, explain it as the product of matter, determined and conditioned by material antecedents, and you have left no room for progress in history, for genius in art, literature or invention. The new cannot be, and along the

groove, worn by the march of ages, humanity must continue to journey forever.

And so you see it comes to this: tested by those tests by which every system of philosophy must be tested, materialism is found wanting. The first requirement of a true philosophy is that it be comprehensive. It must explain more than a few facts. It must be encyclopædic; must take into account the circle of experience — must explain all that is. In short, it must explain being; and if it fails in this it lacks comprehensiveness, and, lacking this, must be cast aside as empty, false, and utterly inadequate as a system. Materialism may be able to explain man on the side on which he finds himself linked to the brute; but on the side by virtue of which he is truly man, and through which matter in him is transfigured and glorified, for that side materialism is unable to account. No philosophy that denies to mind a place as real and essential being, undetermined and apart from matter, can explain the facts as they are or the universe as it exists. But, it will be asked, is mind then, absolutely undetermined, and do not mental consequents follow physical antecedents in such a relation as that it may be affirmed that thoughts

are determined by material impressions? Is it not true that impressions given in the sense are taken up by the mind and woven by a process of reflection into ideas; and is there not such a necessary connection between the material impression and the mental idea as that it must be said that the idea is determined by the impression? The answer is this: Whether the idea shall be determined by the impression alone, depends upon the mind itself. It goes without saying, that one and the same material impression excites different thoughts even in the same individual, to say nothing of the thoughts that such an impression may arouse in different persons. Similar sounds cannot be said to produce similar thoughts, or similar impressions produce similar ideas. The mind may occupy itself with phenomena, may even so far lose itself as to seldom rise above the merely sensuous; but when this is the case, it is by its own consent, and not from necessity. From all determination by the material it has power to separate itself and to say "By these I shall not be determined." It may shut itself up within itself, and in its operations shut out all impressions from without and dwell on the purely ideal,

the transcendental. So, while a clear and sometimes an intimate connection may appear to exist between physical antecedents and mental consequents, that connection is one, the influence of which, and the determining power of which, is, at least in the normal state, marked and limited by the mind's own choice, and is not a relation of necessity. But between these two conceptions there is the widest difference. If that relation is one of necessity, then is mind absolutely determined by matter; is, indeed, lost in matter. But if the relation is one of choice, as we have just shown, then mind may or may not be determined, according as it chooses; and is therefore left supreme, self-existent, self-determined.

But what even if thought in the lower fields of its operations is sometimes influenced by material impressions? Is mind then to be declared determined? Thought is one thing, mind is another. Thought is an emanation; mind is the something that stands back; the something out of which the thought emanates. The thought is evanescent; the mind is permanent. It is that which stands back of the thought, brings thought into being, sits in judgment on it, and hence exists apart from it.

And so it comes that no system that ignores mind as being in itself, no system that aims to interpret the universe as it is, on the supposition that mind is conditioned or determined by matter, can lay claim to being a true philosophy. Every such system when practically applied can neither be made to explain the world without nor the world within us. Even in the writings of those who have been loudest in the defense of such systems, there is well-nigh universally to be found a manifest distrust of the doctrine. Few have defended it more stoutly than John Stuart Mill. But when he found himself face to face with its logical outcome, when he perceived that by it man became but a puppet, an automaton, he practically denied the very principles on which his entire system rested. Open his autobiography and read what he there says: "I felt as if I were scientifically proved to be the helpless slave of antecedent circumstances; as if my character and that of all others had been formed for us by agencies beyond our control and was wholly out of our power." A little further on you have this: "I saw that though our character is formed by circumstances, our own desires can do much to shape those circumstances. That we have real

power over the formation of our own characters." Now let me ask you not to overlook the fact that that last phrase is fatal to all that Mill had ever said in defense of his system. If man has power over the formation of his own character, as he admits, then it is manifest that that power can come not out of matter, but out of mind, independent, uncontrolled and undetermined by matter. Well, now, seeing that the order of the materialist, in which matter is put first, and then mind, cannot be the true order, we have a right to ask whether the real order is not directly the reverse, and whether it be not first mind and then matter. First mind as unconditioned, then matter as conditioned and controlled by it. If we were permitted to get an answer from the metaphysician, it would be unqualifiedly in the affirmative.

To the mind that has dealt fairly with the problem it is no longer a question whether mind determines matter. It was long ago seen that without mind nature could not be; and that until you have mind you cannot have nature. It was a saying of Kant's, that mind makes nature. By this he meant that, looking out on the universe, you have nothing but a disconnected crowd of impres-

sions and ideas; a cosmic mass, but no cosmos. And that until thought comes in and determines every object in its relations, nature could not be. From this we might go on, and, in the name of a true philosophy, affirm that that which conditions is before that which is conditioned. That if mind is, as it must be, the primary element in knowledge, it must also be the primary element in the universe. For if thought is prior in knowledge, it must be prior in being. But we are aware that against this method of reasoning, the charge that we brought against a purely physiological study of man has also been urged. It has been urged that if it is unfair to look at man purely from the physiological side, it is likewise unfair to study him from the psychological. And yet that objection cannot in the present case stand; for we are investigating not the physical, but the mental in man, and are aiming to determine whether this that we call the mental can be explained in terms of matter and force. So far as man is material, he is to be studied by the physical method; on this side he may be investigated as nature is investigated. But man has other than material; he has also mental being, and as the nature philosopher

may, with justice, insist that so far as the material in man is concerned, he be investigated by physical methods, on the other hand, with equal justice, we may demand that man as mental shall be studied, not by the physical, but by the transcendental method. And when so investigated, the conclusion can only be that at which the transcendental thinkers of Germany long since arrived, when they put thought as the primary element in the universe, and reasoned that if thought be prior in knowledge, it must be prior in being ; and that by mind nature is determined.

But the same conclusion to which the transcendental thinkers came may also be reached by another method. And while the materialist, on account of the intimate relation sometimes found to exist between physical and mental states, reasons that the mental is determined by the physical, it will be found nearer to the truth to say, when such connection is observed to exist, that the physical has been determined by the mental, and that, instead of mind being determined by matter, in all of those cases in which mind is at all concerned, the reverse is true, and matter is determined by mind. If mind and matter are, if they

each have an existence, and stand in relation, as they certainly do in man, then must there be some point at which they may be said to touch, and the influence projected upward into the realm of mind from the material side, or downward into the realm of the material from the mental side.

Among physiologists, it has come to be universally recognized that the point at which mind touches matter in man is located in the brain. It is maintained that in the brain matter exists in its most refined and susceptible state. That the arrangement of its particles is such as to render the brain susceptible to the most delicate impressions and influences. And while this is affirmed on the one hand, it is just as stoutly held on the other that no action under voluntary control can take place expect as the brain is in some measure effected; some change effected on its particles, and that the act follows as the direct and necessary effect of such cerebral disturbance. Now see what we have here. I move my arm. You arise from your chair and move across the room. How comes it that these acts are possible? You are to account for them, says the materialist, as the effects of disturbances in the cerebral substance.

Certain particles of the brain were affected or disturbed, and the act followed as the direct and necessary effect of that disturbance. But, I ask, what caused the disturbance, the motion in these particles of the brain? How came they to move? When you willed to move your arm, the cause as affirmed lay in the motion of brain particles. But do you not perceive that this motion in the brain particles must also have had its cause? On the brain cells some impression must have been made. But whence came that impression? Did it come from matter? If so, what was it and how came it? There is but one answer: it came from mind. An influence on the cerebral substance there doubtless was, but it came not from the realm of matter. Out of mind it came, and was determined by mind. No man can account for voluntary action on any other ground. To explain it is to admit that matter is determined by mind, and that the determining factor must itself have been undetermined.

But the operation of mind on matter has not come to its limit in the narrow field of its action on the substance of the brain. The horizon of its operations has by no means been reached when it

has touched the hidden springs of action resident in the nerve fibers and cells of the brain.

However it may come, we cannot reason away the conclusion that, insensibly, the mind makes the body more and more its organ, until at last it becomes possible to read the character of the mind that dwells within, by the fashion that it has given to the countenance, the eye, the tone of voice, and the general bearing of the individual. In the countenance we read the mind. When for any cause the mind chooses to occupy itself with the low and groveling, it can do so, but it cannot hide the thought from the close observer. As a brand was left on the brow of Cain, that told of what he had done, so will the degraded mind leave its mark on the temple of the body, so that while itself unseen, the character of the mind cannot be hid, and we are able to judge what it is, just as certainly as we judge the character of the artisan when we look upon his handiwork.

Whatever objections may be urged against physiognomy, men still preserve their faith in it, and no individual can free himself from the persuasion that the countenance by and by becomes the mirror of the mind. Well has the question been

asked: "If physiognomy be without truth, why do the arts of the painter and the actor steadfastly keep their hold on mankind, and why are the demands on these not merely for pathognomonic, but also for physiognomic representations? And how can the desire be explained which has existed from the earliest ages, and exists to the present day, to see any person who has been distinguished in any way whatever, for good or evil? A desire which would be altogether meaningless without a belief in the correspondence of the external appearance with the inner being."

We cannot but recognize the truth that mental characteristics stamp the bodily form of man, and that it is not by chance that a certain mind carries along with it a certain bodily form that is but the outward expression of itself. But we ask how is this to be explained except on the supposition that the body is informed by the indwelling mind, that it is the mental that determines the material in something, at least, after the same fashion that the artist stamps himself unconsciously on the canvas that he paints or the statue that he chisels? In the words of Mynster: "It must be that the mind appropriates the body to itself and fashions it after its own scheme."

But let us now reverse all this, and with those who deny to mind this determining power, endeavor to account for all these facts by making them the result of physical forces and material causes, and what have we? We are then left absolutely without an explanation of the facts of our inner experience, and all human achievements, civilization and progress in every department go without an explanation. Take away mind in its determining power over matter, leave nothing but the material and its forces, and you are not only left without an explanation of human progress, civilization and achievement, but you have destroyed that in virtue of which and by which these alone can be.

Why is not Greece the same to-day that she was in the age of her pristine glory? In the significant language of Fairbain: "The voices of the gods are heard in her thunders that wander round the brow of Olympus; in the breezes that murmur through the oaks of Dodona; the names of the heroes glorify and immortalize the places where they fought and fell. There shines on Thermopylæ and Salamis, Morgarten and Sempach, a light that never was on sea or shore, creative of the inspiration of the poet's dreams." "Leave the

physical, but change the psychical conditions and the man is changed. Greece has still her Ionic heavens, her laughing sea, the crystal air through which her sons can lightly trip. But neither to Greek nor Turk does the Periclean age return. The occasion can never be the cause. Mind, not matter, must explain the purpose and the progress of humanity."

Moreover, the history of decline in the individual, as well as in the national life, proves that the disintegration is not brought about by material causes. The material environment may remain precisely the same, and the change still go on. The most degraded races, as well as individuals, have lived under the most favorable conditions of air, food and climate, indeed under circumstances in which every material condition was calculated to bring about the most healthful examples of body and soul. And so, on the other hand, the grandest characters, the purest lives, the noblest in every department of the human being, have come under conditions, and in the face of conditions the most adverse.

It is not the material in any of its modes that determines what the individual or the race shall be.

But what then does? Open history and you will read the secret. The origin of disintegration and decline is to be found in the mental, not in the material conditions. In a false and corrupt philosophy, in a depraved and sensuous thinking are to be found the antecedents of decline. This it has been that has entered like a deadly poison into the veins of the civil, social, and national life, and worked out the death of the mighty empires of the past. From their origin to their end, material conditions remained the same. The mental alone changed.

And so, too, has the history of every upward movement confirmed the truth that in the elevation as well as in the degradation of men, the problems to be solved are not those that have to do with the material, but with the immaterial, the mental in man. And so it comes that, in man and in all that to which man stands in the relation of cause, mind, not matter, is the determining factor.

But we have now come face to face with another question. In getting an answer to our first, namely, the relation of mind to matter in man, we have awakened another in regard to the relation

of mind to matter in the universe; there is other matter than that concerned in man. There is another world than the one within — an external world, full of organic and inorganic being. What now is mind's relation to this? Is mind in this outer, as we have found it to be in the inner, the determining factor? In this outer world is mind also first? If we were allowed to get our answer from that great transcendental thinker, Immanuel Kant, it would be this: "Without mind, nature cannot be." "It is mind that makes nature; mind is in the universe as its cause and condition." If knowledge of the external world can be, it can be alone as mind in man stands face to face with mind in nature, alone as a rational being stands face to face with a rational world. Thus would Kant have answered our question. Looking, therefore, fairly at the problem, we shall, I think, come to the conclusion, that in the external world as in the internal, mind must be the determining factor. That as human products in art and literature, in invention and the like, are to be accounted for alone as mind is presupposed, so, in the external world, phenomena are to be explained alone on the admission that mind has been pre-existent.

"Show us a God in nature; prove that nature is his work," says the materialist, "and we will believe." Now there is a contradiction of terms in that demand. The materialist has no right to speak of nature. What is nature? It is the cosmos; the orderly, harmonious system that lies without us. Nature is the living impersonal, which is the opposite of mind and idea, but is exclusively appointed to be the means, organ, instrument for mind and idea, and in its normal condition is exclusively determined by these.

But let us take the materialist at what he means, and let us see in how far his demand may be met and a God in nature be pointed out. We have space but for two propositions.

First: It is alone as mind is postulated that the manifest uniformity of construction in nature in the organic world can be explained. Stoutly have men like Herschel, Clerk Maxwell and others, maintained that this uniformity of construction in the so-called products of nature, infallibly stamps them as manufactured articles, not as the products of irrational agencies, but of an intelligent agent, designing uniformity of product. Now notice what led them to this conclusion. They ob-

served that material agencies produced effects when left free to operate. That water rounded pebbles, that it produced soil, and that in one way and another the irrational agencies of the material world produced their products. But it was also observed that these products were characteristic. They were characteristic in that they lacked uniformity; the pebbles were rounded, but they were rounded irregularly. The soil was irregular in the size of its grains, and variable in its constitution. It was also noticed that wherever the mere blind forces of matter were left to themselves, that this lack of uniformity was always the result. But it was likewise observed that this was not the case in the products of the organic world. That, on the contrary, they always appeared as though fashioned after a pattern. Two ants were more alike than two pebbles. Two leaves of the same family, while vastly more complicated in structure, were more alike than two particles of soil. And so on all through the organic world. Uniformity of product was always found to be characteristic of all nature products.

Then they asked, How came this uniformity? They remembered that between two pieces of

metal cast in the same mold, there was the closest resemblance. Between two pieces of machinery made after the same pattern, there was likewise an intimate resemblance. But in the cases of the piece of metal and the piece of machinery, the likeness was to be accounted for in the fact that they had been made after a pattern. And so uniformity of product in the cases cited, pointed back to an intelligent agent in whose mind the pattern existed before it took shape in the metal piece or in the finished machine.

And thus with these data they came to the only conclusion to which a fair process of reasoning could bring them, and said, that if uniformity of product in the one case proved the priority of mind in which the pattern was wrought out, so did it likewise in the other. They reasoned that uniformity in nature proved a pattern, and that a pattern proved an intelligence pre-existing and conditioning matter.

Now let it not be overlooked, that to no other conclusion, reasoning from the facts, could Herschel or Clerk Maxwell have come. In the study of species there was found to have existed a pattern. And it was equally certain that without

this pattern to which each individual might be referred, species could not be differentiated or a science of the organic world made out. The pattern accounted for the uniformity, the uniformity proved the pattern.

But if there was a pattern, then mind alone could have conceived it. And hence back of nature, pre-existing and conditioning it, mind must have been. But come now to the second proposition :

Without mind pre-existent and determining matter, nature could not be interpreted, or a science of nature formulated.

Let it be understood that there is no argument formulated by skepticism for the overthrow of theism, that does not operate with equal force against itself. Every attempt to demonstrate the impossibility of a knowledge of God, tells with equal force against the possibility of all knowledge. The validity of the principle that makes science possible, makes theology also possible. If nature can be known, God also can be known. See how this is. Ask the question, How comes it that nature can be interpreted, and in virtue of what is such interpretation possible? Do not overlook the fact that when the scientist comes

to nature he comes to it with the conviction that it is an harmonious whole. That it stands together as the parts of a system, part related to part, and each interpreting the whole. But suppose that nature lacked this unity, suppose that one part sustained no relation to another, and had no purpose in itself. Suppose that one phenomenon stood to another as the pebbles on the seashore stand to each other, unconnected, unrelated, and whence then could Science come or what would be its foundation? You cannot interpret a confused mass of pebbles or from such a mass deduce a science. But you can understand the plant, and out of a study of it you can deduce a science.

You cannot interpret a mass of soil, but you can interpret the insect, and when you have studied it, and observed the relation of one of its parts to another, you have what we call science. But how comes this? There is and can be but one answer; there is thought in the one, there is no thought in the other. Matter in itself cannot be interpreted; cannot be known. The more it has been studied the more positive has become the conviction that we must remain ignorant of it. But let matter be lifted out of its normal condition; let it

be transfigured and inwrought by mind ; let parts be brought into relation, then do we know not, indeed, the matter, but the relation, the schema, and this it is that makes knowledge. Let the base matter of gases and minerals in the laboratory of the plant, take form and relation in root, and branch, and leaf, fiber, and flower ; let the unrelated matter once come into relation as it does in the anatomy of the insect ; let base matter come into relation in molecules or in worlds, and then does knowledge become possible, and sciences are built up. But, observe in what this knowledge really consists. It is not the matter, though now in its organized forms, that you know ; it is the schema, the relations, the mind evidenced in these relationships that becomes an object of knowledge. This it is that makes science, and this alone. It is thought in nature that makes nature knowable. Except as nature has been informed by mind, it cannot be known. To be rationally apprehended, nature must first be rational. To be known by mind, it must first embody mind and envisage that by virtue of which it alone can be known.

Enter the workshop of the mechanic. He is

shaping the various parts of a machine, the plan of which he has worked out in his mind. Around you are curiously wrought pieces of wood, and iron, and steel; but they are as yet disconnected, unrelated; but a mass of material. Can yet get even from these already fashioned pieces, anything that you would call knowledge? Can you interpret them? The mechanic may, for he knows the relation of part to part. But this relation does not appear to you, and hence you cannot interpret them. But let the parts be put together so that you may begin to see the relation of part to part, and of each part to the whole. Let the process go on until the machine stands before you, the living embodiment of the designer's idea; then what was before an incoherent mass, becomes that which can be understood by the intellect, and you have added to your knowledge. But what made the interpretation possible? Fix your attention on that. How came it that you could interpret the mechanism in the one case, and not in the other? When you understood it, it was because you read the thought that was embodied in it; because you saw in the completed work an idea; because reason in the machine spoke to reason in you; because

mind spoke to mind; because the mechanism sprang from mind and embodied mind: in virtue of this were you able to know it; without this it could not have become knowledge, for it was mind that gave it meaning.

To make the matter, if possible, still clearer, take Berkeley's illustration. On the ruins of Assyrian temples, on the walls of the tombs of Karnak, amid the crumbling ruins of Mexico, are to be found wonderful signs and inscriptions written there by the ancient races. To scholars, these inscriptions are full of meaning. By patient study, by a careful comparison of alphabet with alphabet, the known with the unknown, scholars have solved the meaning of these inscriptions, and read the history of nations long since passed away. But the thing that makes the interpretation of these inscriptions possible is that they contain thought. Unless they had contained thought, "The wild raven, or the lion with his claws, might have scratched figures on the rocks, but then, no man could have read them." They would then have expressed no thought, therefore could not have been interpreted. It is thought embodied in these inscriptions that makes them possible of

interpretation. Well, now, go out into nature. You say you can understand it. To you it is a grand, beautiful, harmonious system. You see in it relations so invariable that you can get out of them the various sciences. Now what follows? This: you could not understand nature, if nature were not rational, or if it embodied not thought. It is mind in nature that makes nature knowable; rid it of mind, and no man could know it, for it is mind in nature, manifested in relationships, that makes it knowable. Alone as mind in man stands face to face with mind in nature, can knowledge or science be. And so, out of a true analysis of man, as well as out of a true analysis of nature, the place of mind in the universe is determined. In man, if knowledge can be, in nature, if nature can be interpreted, mind must be first. The unconditioned before the conditioned, the undetermined before the determined. Mind in man is the condition of knowledge. Mind in nature, its archetype and interpretation.

It was the vision of this, the perception of mind in nature, speaking to mind in man, that led Tennyson to ask of his soul the question: —

"The sun, the moon, the stars, the seas,
The hills, and the plains,
Are not these, O, soul, the vision of
Him who reigns?

"Is not the vision He? Though He be not
That which He seems?
Dreams are true while they last, and
Do not we live in dreams?

"Dark is the world to thee, thyself art
The reason why,
For is He not all but thou, that hast
Power to feel, 'I am I'?

"Speak to Him, thou, for He hears, and
Spirit with spirit can meet.
Closer is He than breathing and nearer
Than hands and feet.

"And the ear of man cannot hear, and
The eye of man cannot see;
But if we could hear and see this
Vision — were it not He?"

# LIFE.

"I affirm that no shred of trustworthy experimental testimony exists to prove that life in our day has ever appeared independently of antecedent life." — Tyndall.

"That dead matter cannot produce a living organism, is the universal experience of the most eminent physiologists. Life can be produced from life only." — "The Unseen Universe." pp. 229 230.

# LIFE.

In him was life. — JNO. 1 : 4.

IN the year 1809 there was born in Shrewsbury, England, a boy whose name, in after years, was to be inseparably connected with a theory which, more than any other, was to disturb the current of the religious and scientific thinking of his times. His name was Charles Robert Darwin. From his infancy he was in love with nature; roaming the hillsides, or wandering alone in the sequestered forest that stood not far distant from his father's dwelling, young Charles in his leisure moments might have been seen looking with boyish curiosity at every thing that he saw; studying, in his boyish way, the various forms of animate life that peopled the downs, the stream, or the pond. This was his favorite pastime.

Thus, early cultivating the acquaintance of nature, she revealed to him her secrets, and when he came to manhood he understood her as did few

others of his time. In 1859 he published his work entitled "The Origin of the Species by means of Natural Selection," which at once attracted the attention of the thinking world. Not that the theory, which in this work he advocated, was new; it had been the favorite theory of certain thinkers centuries before. But in him it received a new impetus, and out of his wealth of nature knowledge, in the estimation of some, it also received new corroboration. Though as much may not be said of many of his disciples, it is due Mr. Darwin to say that he was sincere. He firmly believed that the system of evolution was the system according to which nature could best be explained; and so, in the interests of that system, he spent his life. When one reflects on the kind of a man that Mr. Darwin was — his kindness of heart, his nobility of nature, his honesty of investigation — a feeling of regret can hardly be repressed on account of the fact that his name has come to be inseparably associated with a theory so soon to be discarded; for already the verdict of Science is against evolution. Here and there on the list of investigators may still be found, associated with this system, the name of an investigator of some prominence.

Spencer, Haeckel, Bastian, and a few others, are still on the side of evolution. But, as a system of nature, evolution has lived its day. Faulty as a theory, and unsubstantiated by fact, by the foremost of modern scientists it is at present rejected. Tyndall, Mivart, Dawson, Dana, and a host of others who are unquestionably leading the van of modern scientific thought, as well as shaping the thought of the future, are against it.

But whatever may be our judgment of the theory that Mr. Darwin advocated so earnestly, it cannot be denied that the discussion which sprang up around it has been of immense profit. For, by that discussion, the attention of men has again been turned back to an old problem, and new attempts made to solve it. I speak of the problem of life. Stimulated by what Mr. Darwin said, new attempts have of late been made at its solution, and the question has again been asked, How is the presence of life in the world to be accounted for? In his work on "The Origin of the Species," Mr. Darwin plainly affirmed it as his conviction that the development of the species was a natural process. He affirmed, that, starting with life, variation, heredity, and natural selection, are sufficient

to account for the varied forms of organic life. But to his credit let it be remembered that the theory of evolution, as held by him, was never meant to explain facts which others of his school have vainly attempted to make it cover. He never meant that the theory of evolution should be made to account for life as to its origin. And it has been the unwarranted assumptions of many, whose names have been mentioned in the same category, that has brought the system of Mr. Darwin into disrepute. Herbert Spencer, Ernst Haeckel, and others, while usually classed along with Mr. Darwin as evolutionists, are not evolutionists, in the sense in which Mr. Darwin was an evolutionist. With them, development is made to account for all; not only for new species and forms, but for life itself. They affirm that matter holds within itself "the promise and potency of all life," and that when matter is brought into certain relations, life may be evolved out of it. And thus with them evolution is a causal theory . . . given but matter and force, and out of these may be evolved all that is, or that can be. Matter and force are the creators of life.

Not so did Mr. Darwin regard the theory of

evolution. With him it was never intended to be anything other than a modal theory. He meant it simply to describe the process according to which nature worked. He started with life, and held that back of it in our search for its origin, experimental science could not go. He believed that if the origin of life was to be found, it could be found alone by transcending the limits of the experimental ; in short, life in his judgment was to be referred to the miraculous interference of an intelligent Creator at least to initiate the process. But once having life in the world, then he held that the system of evolution could be made to account for the almost infinite variety of its manifestations. And thus you see, that between these views of evolution, especially in their relation to the great problem as to the origin of life, there is not only a wide, but also a most essential difference. As held by Mr. Darwin, evolution not only left room for, but it indeed demanded the interference of an intelligent Creator at least to initiate the process. But as held by the opposite wing of the evolutionist school, evolution denies the interference of a Creator and is little else but a synonym for atheism. It deifies matter and force, and makes out of them its God.

Now, with this system as held by Mr. Darwin, we have nothing to do in the present discussion. Whether it has proved itself adequate to the test even as a modal theory we shall let others more competent than ourselves decide. It is only in so far as the theory of evolution bears on the question as to the origin of life, only so far as it is made a causal theory, does it concern us now. What has been the origin of life? Has life been evolved out of matter according to certain fixed laws? Or is its presence in the world to be attributed as Mr. Darwin attributed it, to something higher than matter; in short, to a personal Creator, who possessing life in himself, at some time communicated that life to the non-living matter of the present world? To make ourselves acquainted with the more recent investigation as bearing on these great questions, is at present the task before us.

To begin, therefore: our first aim must be to get a clear conception of what is, in strictness, living matter. For I need hardly tell you that apart from matter we cannot study life at least by the experimental method. Even if we could form some mental conception of what life in itself may be, we

could never be certain as to the correctness of our ideas. Their correctness could never be scientifically established, for life can be studied alone as it exists in living matter. But now as to what is in reality living matter, there is among many a very erroneous notion; and few terms in our common conversation are more loosely used than this term "living." In our study of the plant here, one of the first things that attracts our attention is a steady process of expansion, in the on-going of which nutrient matter is assimilated and changed into the material of root and stem and leaf and flower. This process we call growth. And when we wish to distinguish between the plant and some inanimate object, we speak of it as living. In the brute and in man we observe a like process of consumption and regeneration; and when speaking of either, we again make use of this term and speak of the "living" brute or the "living" man, as the case may be. And thus we have come to regard the entire structure of the plant, of the brute, and of man, as living. But such is not in reality the case. By far the greater part of every so-called living structure is not living at all, but is dead or formed material. Not more

than one fifth of the material in the human body, or in the framework of the plant yonder, is really alive, or can properly be called living matter. The only part in any structure that is really alive, is those little masses of semi-fluid matter to which the older biologists gave the name cells. If therefore our aim is to make ourselves acquainted with living matter, we must not only begin, but we must also end with the cell, for, apart from it, we shall nowhere in the present world find life to be in association.

And now that we may get a proper conception of what a cell is, and hence some idea of what the nature of living matter is, let us suppose an experiment.

We have here, let us say, a grain of wheat. If, now, we drop it into a vessel containing water, it will soon send out its tiny roots downward, and a little shoot, destined to become the stem, upward. If, after a reasonable time has elapsed, we were to take one of these little shoots, and by a delicate movement of the section knife were to cut a very thin section from it, and then examine the section thus obtained with a microscope, we would find it to be composed largely of exceed-

ingly small round or oval globules closely packed together. These are the cells; but as you look at them now, they present very much the same appearance that a mass of frozen drops of water would present; for as they lie thus together in a compact mass you see nothing but their outlines, and would hardly suspect their being made up of parts. But if instead of the pure water in which the little root grew, you had used water with which an ammoniacal solution of carmine had been united, the section would on examination present quite a different appearance from the one it presented before. For as the process of growth would now go on, the carmine fluid, taken up by the pores of the root, would stain the cells, so that, instead of appearing as before, perfectly transparent and homogeneous, they would now be found to be made up of parts. Inside the fluid mass of the cell would be found one or more bodies called nucleus or nuclei, according to the number, and in addition to these, outside the fluid mass would be observed a membrane or wall. In short, we would find that each cell instead of being constituted of a simple mass of homogeneous protoplasm, is in reality made up of three parts: the wall; the fluid mass

within the wall; and the little body called the nucleus. Essentially the same appearance would be presented, if instead of a thin section of a plant we were to substitute a small piece of animal tissue. For when stained with the carmine fluid the cells contained within it will likewise be found to be made up of the three parts already named; the cell wall, its fluid contents or bioplasm, and the nucleus.

Now, until recently, most biologists regarded the cell, made up as we have learned of its three parts, as the only material form with which life could be associated. They insisted that wherever life was, there also was the cell with its three parts; they called the cell "the ultimate morphological unit;" and by that they meant that these little bodies alone were concerned in vital action, and that by them every tissue whether of bone, or muscle, or nerve, or bloodvessel was built up. It was held that these were the machines by whose agency every organism in the category of organic being has been wrought and fashioned; here they have busied themselves in the building of the flower with its stamens, its petals, its pistil and seed lobes; there building the bones, the

framework of the human body; here fashioning the membrane of the ear, there the delicate and wondrous senses of the eye: everywhere taking of the unformed material and working out of it the various parts of the limitless forms of organic life.

Now the work that is done by these little artisans, the cells, was held to be this: to transform dead material into living material, and then this again into the formed material of the tissues. For every part of an organism when once built up has been fashioned out of dead material in the workshop of life. Every formed part was once dead material, then transformed into living material, then deposited as formed material; and so while it is true that the greater part of every organism is dead, yet every particle of it was once alive; for it is by being made living, that former material is wrought out of dead matter.

But see how these cells accomplish their work. Here, let us say, is one of these living units, a cell, possessing as it does the power of changing non-living matter into living, and then again in its tiny workshop, working this living matter into formed material; the dead matter out of which it

is to build is called pabulum. Well, here is our cell surrounded by this nutrient matter, or, as it is called, pabulum. Now watch the progress as it goes on. The first thing observed, is the minute particles of pabulum passing through the cell wall into the interior of the cell. Here it comes in contact with the bioplasm or living matter that is inclosed by the cell wall. When the pabulum once comes in contact with the bioplasm of the cell, it is at once changed into living matter or bioplasm. Then losing again its life, that which was once pabulum, and in its second stage bioplasm, is now deposited inside the cell wall as formed material. At first we would observe this formed material appearing as a thin film on the inner surface of the cell, the film gradually becoming thicker and thicker by the gradual deposition of the formed material.

Thus we should see our little artisans building up tissue after tissue, and effecting that wonderful phenomenon called growth. Out of the non-living pabulum, the bioplasm of the cell makes living matter, and while in the living state works it into the formed material, of which every organism, whether of plant or animal, is in the main composed.

But now we have come to a point at which I must ask you to make a distinction. If we are to study life in the light of the most recent investigation, we must distinguish between what was formerly and what is now regarded as living matter. The necessity of this distinction arises from the fact that recent investigation has shown the former biologists to have been in error in regard to the answer given to the question as to what is distinctively living matter. It was held formerly as I have already indicated, that living matter is the cell as such, and biologists spoke of it as the "living unit." But at present, with a better knowledge than was then had, it is almost universally felt, that either the definition then given of what a cell is must be discarded, or else so enlarged as to make it cover any simple mass of bioplasm. As a consequence, the answer that is now given to the question, What is a cell? is quite different from the answer given to the same question years ago. Prior to the year 1869, a cell was described as we have described it: as a living unit made up of three parts; cell-wall, fluid contents, and nucleus. It was then held that life belonged alone to the cell as thus constituted. At present, how-

ever, it is clearly established that two of these parts are not essential to the presence of life, and do not necessarily belong to living matter. But that life may be when both cell-wall and nucleus are absent, and nothing present but the fluid contents or bioplasm. In other words, it is now settled that bioplasm alone is living matter.

Well, now, I have called your attention to this because of this fact, that you will often hear the statement that the cell theory has been abandoned; and I wanted you to understand the precise feature of it that has been outlived. Its defect was, that it defined the cell as a living unit made up of the three parts already mentioned, and narrowed life down to the cell as thus defined. And when it was afterward found, as we shall presently learn, that life was not confined to the cell as such, but existed where nothing was but simple bioplasm; that the wall and nucleus were in no way essential, and that the smallest mass of bioplasm might with perfect propriety be called a cell, in that it did all that the former biologists attributed to the cell, then was the cell theory, so far at least as its definition is concerned, abandoned and the fact established that bioplasm alone

is living matter. To-day, outside of Germany, the cell theory with its defective definition has but few advocates. Originating as it did with the great German naturalist, Schleiden, it may perhaps be, that a reverence for its great originator has had something to do with its present hold in the Fatherland. But however that may be, its essential defects have long since been demonstrated. Early in the present century the eminent physiologist Fletcher pointed out the error in the cell theory, as then held, and showed that its definition of living matter was too narrow. He proved that in some cases, at least, living matter was structureless and that life was not contingent on matter arranged as it was in the cell. But while Fletcher headed the movement that has since culminated in what is now called the Protoplasmic Theory of Life, it remained for Lionel Beale to demonstrate the truthfulness of the position that Fletcher took. In his work on Bioplasm and also in that entitled How to Work With the Microscope, this unsurpassed investigator conclusively shows the error of the cell theorists, and establishes on the one hand, that life is not contingent on the presence of either cell wall or

nucleus, and on the other, that both cell-wall and nucleus are but after products, the results of bioplasmic action. By Beale, living matter was narrowed down to one single substance, viz; the fluid contents of the cell; for when you have taken away the little bodies in the interior and also the membrane on the exterior, you still have left the semi-fluid mass. Well, now, when Beale found that both the cell wall and the nucleus might be absent and life still be present, he came to the only conclusion at which it was possible for him to arrive, which was, that life had alone to do with the fluid contents of the cell; that it alone was living matter. He then showed that wherever it was present life was also present; that when it was absent life was also absent. To this semi-fluid mass, always found within the living cell, he gave the name bioplasm.

But see now how Beale proved that bioplasm alone is living matter. His proof rests on a principle well known to every one at all acquainted with microscopical technology; the principle of selective stains. In order to illustrate the method by which Beale proved his position, let us once more suppose an experiment. Let us suppose

that we have here a thin transparent tissue taken from some portion of the animal body. If it has been selected with a view to our experiment, it will contain in it, muscular fiber, connective tissue, blood vessels, nerve threads and cells. But having placed it under the microscope, you will find it well-nigh impossible to differentiate the various tissues ; the structure will appear nearly homogeneous. There are the nerve fibers, but you cannot trace them on account of the fact that they present the same appearance as the surrounding tissues. There is living matter and formed material, but you cannot distinguish the one from the other. Well, now, if you remember that the chemical constitution of each of these parts differs from the chemical constitution of the others, you will understand why it is that different chemical compounds will act on these various parts in different ways. One compound will stain one particular tissue, say the muscle, while it will have no effect whatever on the nerve fiber. Another fluid will take hold of the living matter and give to it a certain color, and at the same time leave the formed material unchanged.

Take, now, the tissue which a moment ago we

put under the microscope, and which then appeared to be perfectly homogeneous; put it here for a few moments in a watch-glass containing a solution of picro carmine. If you now examine it, you will find that you have stained the connective tissue and the nuclei a bright red, while the muscle has retained its normal color. Now transfer it to a vessel containing water to which a few drops of acetic acid have been added, and when thoroughly saturated transfer it to a solution of safranine, and you will observe that you have now succeeded in staining the muscle and the epithelium. If now you put the tissue again under the microscope, it will present quite a different appearance from that which it presented in the first instance. You have now, on account of the difference in color of the various tissues, no difficulty in differentiating each particular one, any more than you would have in selecting the white threads from the black in a cotton fabric.

Now it was the application of this principle of selective stains to the various tissues of living organisms, that furnished Beale with the facts whereby he sustained his position that the thin, viscid material found in the cell, alone was alive.

He found that when a portion of animal or vegetable tissue was immersed in a solution of carmine, the living matter was always stained by the fluid. By repeated experiments he proved that wherever there was living matter, the carmine was sure to find it, select it out, communicate to it its color, so that when examined under the microscope it became an easy thing to distinguish the living matter from the dead or formed material. What now became of the cell theory when this selective power of carmine was discovered and its affinity for living matter established, I have already indicated. By the carmine process it was shown that the cell-wall was simply formed material; that it did not live. Through it to the interior of the cell the carmine fluid passed and repassed, and while it never failed to stain the bioplasm within, it had no effect on the cell-wall itself. Thus it was shown that not the membrane, but that which was contained within the membrane was the essential thing. That the cell-wall had no more to do with life than the shell which the snail secretes has to do with the life of the snail itself; and that as the shell of the snail is but the secretion and after product of the living animal, so is the cell-

wall but the product of the living bioplasm within. But as the cell-wall was thus proven to be not an essential element, so also with the nucleus and nuclei; for it was found that bioplasm in a comparatively quiescent state is not unfrequently entirely destitute of either. In many of the fungi and lichens the nucleus was found to be wanting, and the same was found true even in many forms of the amœbæ. It is the oft-expressed opinion of Beale that the nucleus and nuclei, like the cell-wall, are after products, and that the bioplasm having been first formed, these appear in it afterward as new centers of growth or of more intense vital activity. He believed that while they possess the same composition as the material of bioplasm, they by no means constitute an essential factor, from the fact that life may exist whether they be present or absent.

Well, now you see what, as the result of recent investigation, has become of the cell theory as such. It held that the cell, made up of the nucleus, cell-wall and fluid contents, was a living unit; that the phenomenon of life could be manifested alone when each and all of these were present and existed together as a unit. But when it

was found that the cell-wall was often wanting, and that the nucleus was by no means invariably present — in short, when it was found that bioplasm was the only element that could not be dispensed with and life yet be present — then was not only the cell theory abandoned, but the fact also established that bioplasm alone lives; it alone is living matter. Now that was a great step. You can see at a glance that it wonderfully simplified the problem of life, in that it narrowed living matter down to one simple homogeneous substance, the transparent and colorless, and, so far as can be ascertained by examination with the highest powers, perfectly structureless, bioplasm. But having made this advanced step towards the solution of the great question, another was immediately attempted. When it was settled that protoplasm, or to use Beale's term, bioplasm, was the only living substance, then the nature of bioplasm itself became the subject of investigation. It was asked, May not this living substance be produced? May not its chemical formula be determined, so that by a proper combination of the elements entering into its composition, living matter may be evolved? For is not life, after all, but the

result of the union of chemical elements united in a certain way and in certain proportions? Well, these are the questions at which scientific men have assiduously been working for more than a quarter of a century, and with what results we shall presently see. Clearly the first thing to be determined was, whether this living matter is identical in all living structures. If bioplasm is not identical, if the bioplasm of the oak, or the flower, differs from the bioplasm of the amœba or man, if that of the most simple living structure is not the same as that of the most complex, then the question would have been indeed a most intricate one. But that difficulty did not stand in the way. By the aid of the microscope and the various tests known to the chemist, bioplasm was found to be identical, and the fact established that wherever found it has always the same composition. It has been proven that the bioplasm of the embryo is the same as that of the adult; that that of the most inveterate morbid growth could not be distinguished from that of the healthy tissue, and that even the bioplasm of the lowest fungus is the same as that of the brain of man.

And thus you see what have been some of the

results of these recent years of biological investigation. To a certain extent those results have been most satisfactory. On the one hand, living matter has been clearly defined; the fact has been established that the only matter that lives is the thin viscid and transparent fluid of the cells, and on the other hand it has also been settled that between the bioplasm of the lowest and that of the highest organism no difference exists, and that bioplasm everywhere and under all circumstances is identical. And thus you see what progress has of late been made toward the solution of the problem of life.

It is clear that now but one step remains, and that is the production of living matter. For you see that before the question as to the origin of life can be said to be answered by experimental science, it must not only tell us what living matter is and what it is not, but the process whereby living matter has been evolved must be demonstrated. Bioplasm, obtained otherwise than from pre-existing bioplasm, must be compounded or at least shown to exist, for until that is done Science has not solved the problem of life. Anything short of this is but to trace living matter to pre-

existing living matter for its origin, and thus to go from one member of an infinite series to another without coming any nearer to the crucial question as to how life came to exist in the first member of the series. That life comes from pre-existing life we know; experience everywhere teaches that fact, and every experiment hitherto made has but served to establish the dictum that life has and can come alone from pre-existing life. Until it can be shown that certain elements united in a certain way, until it can be shown that when matter is brought into certain relations and submitted to certain conditions, life is the result, then and not till then is the task achieved. But I need hardly tell you that this has proven the most difficult task of all. So far, at least, every attempt at the production of living matter has culminated in absolute failure, and from the nature of the case, all such attempts in the future must meet with the same result. Out of the secret chambers in which the mysteries of life are concealed there comes a voice that speaks to experimental science and says, "Hitherto shalt thou come, but no further."

But look now at what has been the history of

the attempts at the production of living matter. When it was found that the bioplasm of all living structures was identical, then the task of producing bioplasm was attempted. The first attempt was made by the chemical method. It seemed probable that if bioplasm or living matter could be analyzed, and its formula once determined, that then by a synthetic process its elements could be combined, and thus living matter be produced. The work was begun. In more than a hundred laboratories something analogous to that wonderful substance which has power to change the non-living into the living, that builds up the wondrous structures of bone and muscle and fibre, was compounded. So far as the most delicate tests could show, this artificial substance was precisely the same as that produced in the laboratory of Nature; it seemed to be the same as the bioplasm which pre-existing bioplasm produced. But when thus artificially produced, one thing was lacking — the substance did not live. Persistently life refused to be associated with it. It might be subjected to the most favorable conditions, but it still remained as its elements had been before, simply dead matter. Abortive as were the at-

tempts of the ancient alchemists to produce the philosopher's stone, so also has been every attempt to wed the mysterious forces of life with artificial protoplasm. And thus out of these repeated failures it has come to be recognized by biologists that by no process is it possible to produce living matter. A material similar to that with which life has once been associated, or if you please, the dead matter of a once living organism, may be compounded by the chemist. He can produce a substance in character and in composition precisely similar to the substance which once lived, but a living substance no man can produce ; for, observe : that what a mass of protoplasm is composed of when vitality has ceased to exist in it, is quite a different question from the one as to what such protoplasm was composed of while possessing vitality. Matter that once lived may be analyzed and then imitated ; but matter in the living state cannot be analyzed, for to analyze it is to destroy its life and leave it no longer living matter.

You see, then, the cause of the failure hitherto in the production of living matter, and can understand how it must be that the same cause being

as it shall be ever present, must ever stand in the way of every attempt to get at the origin of life by the experimental method; for it is evident that if living matter cannot be analyzed then neither can it be compounded.

Open here Beale's work on Bioplasm and read what this foremost investigator has to say on the subject of living matter as compared with the dead matter with which life has once been associated. These are his words: "When the life of a mass of bioplasm of any kind has once been cut short, lifeless substances having similar properties result. When a mass of bioplasm dies, it is resolved into fibrine, albumen, fatty matter and salts. These things do not exist in the matter when it is bioplasm, but as the latter dies it splits up into these four classes of compounds."

Read also his testimony in his work on "How to Work with the Microscope:" "Authority may continue to refuse to admit, or may deem it expedient to deny that the living state differs absolutely and entirely from the non-living condition, but the truth remains that in the living state of matter, whether in the living matter of the growing fungus, or that concerned in mental

action, material forces and properties are somehow governed and controlled, and in a manner not to be imitated by us, or to be explained by anything known concerning non-living matter, while it is incontestable that the moment the matter ceases to live, its capacity for manifesting its ordinary properties returns." Let me ask you not to overlook one very significant phrase in that statement of Dr. Beale's. It is the one in which he affirms that in "living matter material forces and properties are somehow governed and controlled, and in a manner not to be imitated by us." It has now been well-nigh ten years since Dr. Beale penned those words. To materialistic thinkers — to those who affirmed that living matter could be successfully imitated, they doubtless sounded like an ominous prophecy. But that prophecy has not yet been impeached, nor from the very nature of the case will it ever be. Even before Beale, Fletcher had made statements precisely similar. "It seems probable," says Fletcher, "that during this temporary living state the elements do not exist in a state of ordinary chemical combination at all; these ordinary attractions or affinities seem to be suspended for the time. And again, "To

assert that living matter is 'protein' or 'albumen' is to assert that which never has been or can be proved, and all arguments based upon such assertions must be discarded."

And thus the attempt to get the living out of the dead, at least by the chemical method, according to the testimony of the foremost biologists of the present must be abandoned. More than a quarter of a century ago it was held by the best thinkers that living matter was matter in a state utterly *sui generis.* And the correctness of that judgment is now but demonstrated since men have been looking more profoundly into the question. The verdict therefore of biology as it is now given is this: Life is not the result or outcome of material elements united in any known way, but is the product of pre-existing life. Or as Virchow has since put it, *Omnis cellula e cellula.* That proposition, first affirmed by Schleiden, and re-affirmed by Remak and Virchow, stands as the fundamental principle upon which the science of biology to-day rests.

Well now since the chemical method has so utterly broken down, and the impossibility of getting at the origin of life by that method has

been demonstrated, in despair, a few of the more rabid materialists have turned backward and are now making an attempt to bring forward an old hypothesis. I speak of the hypothesis known by the title "spontaneous generation." But in view of what has just been said, I think I shall not need to dwell long in order to show the error inherent in this revived hypothesis. For you can easily see that the facts operating against the evolution of life by the chemical method, must also operate against its evolution by the supposed processes of spontaneous generation. For, after all, spontaneous generation is but an assigning to Nature the task of producing life by the same methods and out of the same materials which have so often failed in the hands of the chemist. What man cannot do by the use of certain laws and methods, this hypothesis affirms that Nature has done by precisely the same laws and methods.

And yet, strange as it may seem, out of an unwillingness to face the conclusions which Biology to-day forces upon the materialistic thinkers of our times, this ghost of the seventeenth century is again brought forward into the arena of scientific combat, in the vain hope that it may do service in the present extremity.

Astounding, in view of what is now known concerning life, is the statement of Dr. Bastian, in his "Beginnings of Life." Here are his words: "Both observation and experiment unmistakably testify to the fact that living matter is continually being formed *de novo*, in obedience to the same laws and tendencies which determine all the more simple chemical combinations."

Now, instead of observation and experiment unmistakably testifying to that assumption, they unmistakably and unqualifiedly testify to directly the contrary. But let me tell you here how Dr. Bastian came to make this assumption, in order that you may the better know precisely what estimate you are to put upon it. Taking an infusion of hay or of other organic matter known to contain living germs, he put it into glass vessels which he then hermetically sealed so as to exclude all outer air. These vessels with their contents, were then subjected to the boiling temperature for several hours; until as he supposed every germ had become lifeless. The contents of the vessels, were then examined under the microscope, and living bacteria were found. And so when Dr. Bastian found these myriad forms of life in the

water which he supposed had been rendered sterile, he reasoned that inasmuch as all former life had been destroyed, the life which was now present could be accounted for alone on the supposition that it was spontaneously produced. As a deduction from these experiments he made the assertion to which I have called your attention.

But now if you remember that the temperature at which all germs are certainly destroyed has not yet been fixed, and that many are capable of sustaining a temperature much above that of boiling water, you can see how presumptuous a statement such as that must be. And when you also bear in mind the difficulty involved in effectually preventing germs from coming in contact with the water even after it had been rendered sterile, you will be prepared to accept all such statements as these with the largest grains of allowance, as well as perceive how Dr. Bastian was liable to come to his erroneous conclusion. His error was pointed out by Professor Tyndall. Repeating the experiment with the hay infusion, with greater precautions, and with far more manipulative skill, Professor Tyndall showed that all that Bastian had said was without foundation. He proved that

when the proper precautions were observed to destroy the germs in the glass vessel, not a vestige of life appeared in the fluid when afterward examined. And though acknowledging his own regret at the results of his experiments, this is his conclusion, stated in his own words: "I affirm that no shred of trustworthy experimental testimony exists to prove that life in our day has ever appeared independently of antecedent life." Read also the article on Biology, written by Professor Huxley, in the Encyclopædia Britannica, and when you have read it put it here over against the statement of Dr. Bastian's: "That living matter is constantly being formed *de novo* in obedience to the same laws and tendencies which determine all the more simple chemical combinations." These are Professor Huxley's words: "Not only is the kind of evidence adduced in favor of spontaneous generation logically insufficient to furnish proof of its occurrence, but it may be stated as a well-based induction, that the more careful the investigator and the more complete his mastery over the endless practical difficulties which surround experimentation on this subject, the more certain are his experiments to give negative results, while

positive results are no less sure to crown the efforts of the clumsy and the careless."

Such, then, is the attitude of the more careful and far-sighted of modern biologists toward the theory of spontaneous generation. As a theory of life it has been proven inadequate, and as a fact, it exists not in Nature. But it is not my purpose to speak lightly of experimental science. In view of what it has achieved no man can speak in terms of disrespect in regard to it without belittling and stultifying himself. We have done too much of that already. In many things it is true she has failed. On many of the more important and vexed questions that concern us she has not given us the light which we hoped and perhaps expected her to give; but we must not expect the impossible. Neither must we forget that experimental science has not yet given us a theory of life that will stand the test. At one time it offered the physical theory, and said that life was the outcome of material elements united in certain proportions and under certain conditions. To-day, retracting its former statement, it declares that theory unscientific and in no wise capable of solving the problem of life.

Again in the hypothesis of spontaneous generation, a new theory of life was proposed. But when it came to testing this theory by the very experiments which should have given positive results, it too broke down, and to-day discarded by respectable scientists everywhere, it has already been withdrawn. We are left therefore without a theory of life, at least from the scientific side. But while experimental science has given us no theory of life, its efforts at the solution of the problem have not been in vain. Out of these years of scientific investigation two principles far-reaching in their significance have forever been established. Those principles are these: —

First, all life in the present world is to be traced to pre-existing life.

Second, life is not the result of a gradual development or passage of the non-living into the living.

It would be impossible within our prescribed limits to array the testimony at present given on the side of the first proposition. On its side stand men like Louis Agassiz, Virchow, Elam, Tyndall, Dawson, Dana, and a host of others whose names stand brightest in the constellation of modern

scientific thinkers. In the significant words of Professor Huxley it may be said, "The doctrine of biogenesis, or life from life, is victorious along the whole line at the present day."

But none the less positive is the testimony on the side of the second proposition. Turn again to Lionel Beale and read his testimony on this point: "There is no transition from the non-living into the living state, but matter passes suddenly from one state into the other. Neither is there in any case a gradation from any form of non-living matter."

Again in his work on Protoplasm you have this statement: "The ultimate particles of matter pass from the lifeless into the living state, and from the latter into the dead state suddenly. Matter cannot be said to half live or half die. It is either dead or living, animate or inanimate, and formed matter has ceased to live.

Well, now you see the shape in which the problem relating to the origin of life to-day stands, and how near Science has come to its solution. It is true that so far at least the results have in the main been negative, and the origin of life has not yet been shown by experimental science. But

the investigation of the problem has also had its positive side. For having searched in vain the fields of the natural, Science to-day stands in devouter attitude than ever before, and in answer to our question, "Whence came life?" points her finger toward the unseen. It is certain that life is here. As a factor of the present world, its presence is to be accounted for.

Scientifically it is equally certain that there was a time when in this world life was not. Silently the globe wheeled its flight through space, when throughout its mighty chambers no life of spore or monad was present. Over the mighty empires of the earth now teeming with life and movement, Death reigned as universal king. But life now is here; in rayless ocean depths, on Alpine peaks amid eternal snows, on every shore and beyond every circle, yea, even in the empty air the hum of Nature's industry is heard. But whence came life? Before you answer that question, let me ask you not to lose sight of those two propositions which are to-day affirmed by the foremost biologists: —

First, that all life in the present world is to be referred to pre-existent life.

Second, that life is not the result of a gradual development or passage of the non-living into the living; and with these propositions, wrought out in the heat of well-nigh a century's investigation before your mind, answer me the question, Whence came life? It was not here once. In the gaseous state of the infant world life could not exist. It has been an after product. It came in the fullness of time. But whence, and how? It will not help you to say with Sir William Thompson, that the germs of living matter have come to our globe borne on the shoulders of some meteor or fragment of some other world. That assumption but shifts the difficulty without solving the question. For how came life to these other worlds? Like ours, they too have once been in a gaseous state, and with such a state life, whether here or there, is incompatible. Trace life, if you please, from this world to another, and from that back again to another, and so on until you have swept the galaxies, and at last you will be left standing on the verge of the same chasm that confronted you in this — the chasm that yawns between the living and the non-living, and that somewhere and somehow has been crossed.

This side of that chasm is the natural; the other side is the spiritual; this side is the seen; the other side is the unseen; this is the temporal, that the eternal. What if experimental science cannot show us how that chasm was crossed and life brought from the other side to this? That it has been passed is certain; that it could not have been passed without the intervention of a divine hand is the conclusion to which the more recent investigations in biology unmistakably point. Face to face with that conclusion, accepting it as the necessary result of the most careful and accurate scientific investigation, stand Elam and Dawson and Agassiz and Carpenter and Lionel Beale. With him who aforetime saw the heavens opened, these unite in testifying that, "In Him was life." If life in the world was not; if life comes alone from pre-existing life, then does it follow that the life that now is has been communicated to the non-living by Him who hath life in Himself. That One who lives, and shall live forevermore.

# THE BRAIN.

If a man die, shall he live again? — Job.

# THE BRAIN.

SHALL it be with me as it is with the brute? When the extinguisher is put down on the lamp here, shall my life, as its, go out in everlasting night? or shall my lamp, after the extinguisher is down upon it here, gleam on in a richer brightness there? Not if materialism is true. If there is nothing of me but bone and muscle and fiber and cell, then when these are destroyed, as they shall be by death, all is destroyed, and I hope in vain for a life beyond. But if there is something within me that is independent of bone and fiber and muscle and cell, then when these decay, as they shall, that something may live on.

Until quite recently, no affirmative answer could scientifically be given to our question regarding man's immortality. But the answer that Science now gives is more than a qualified affirmative. One thing at least is certain. If the soul is independent of the body here, it may be hereafter. If the musician is not a part of the instrument,

then the destruction of the instrument cannot be the destruction of the musician. And if the soul plays on the fibers and cells of the brain as the musician does on the instrument, then the soul is independent of these fibers and cells, just as the musician is independent of the instrument. And if the destruction of the instrument is not the destruction of the musician, then the destruction of these fibers and cells at death is not the destruction of the soul.

It is apparent, therefore, that the question as to the separate existence of the body and the soul in the present state bears most intimately on the question of our immortality. If the soul in the present state maintains a separate existence, then is the relation which the body sustains to it not an essential one. The question, then, for us to answer is, Does the soul even in the present state maintain such a separate existence? Does it play on the fibers and cells of the brain as the musician does on the instrument? If it does, then it cannot be a part of the body, and must be independent of it.

In his work on "Mind and Body," Professor Alexander Bain makes this significant admission:

that there is no intrinsic improbability attaching to the supposition that the mind may exist altogether distinct from the body. Martensen, one of the most learned and careful of German writers, in the first volume of his "Christian Dogmatics," says, "In certain states of ecstasy and of vision, there appears for the moment a separation of the soul from the body, an existence apart from the body, in which the soul is not absolutely without the body and without nature, but lives in a manner free of the body and of nature; and this may be described as a type or anticipation of its state after death." Archbishop Manning, cited with approval by Dr. Carpenter, says, "There is still another faculty, and more than this another agent, distinct from the thinking brain."

And thus in the estimation of some of the most far-sighted and trustworthy thinkers, it appears at least probable that the soul may have an existence independent of the body even here. But in regard to a question so far-reaching in its consequences, we cannot rest satisfied with mere probabilities. Realizing that our hold on this life is gradually yet certainly losing as the years rush on, drawing nearer and nearer to the darkness,

knowing that shortly we must feel the touch of its dampness upon the cheek, we would be certain if possible as to whither we are going. One thing we know. If the soul is independent of the body here it may be hereafter. If it is not — if it is dependent on fiber and cell — then so far as Science can show, we must be content to enter the darkness with the bandage upon our eyes. It shall be our purpose in the present discussion, to look at the physical basis on which our hopes of immortality are grounded, in order that we may see in how far those hopes are consistent with well-established physical facts.

Before, however, we are prepared to investigate this subject in its scientific light, or are qualified to estimate the bearing which the results of modern investigation have upon it, we must make ourselves acquainted with the material mechanism concerned in action and thought. Before the musician can produce harmony, he must have the instrument. But as an inspection of the instrument and a study of the arrangement and relation of its various parts will let us into the secret of how harmony may be produced when its keys are pressed by the fingers of the musician,

so will an inspection of the anatomy of the brain and the nervous system of man let us into the secret of how mental and physical action may be accounted for.

With the most recent works on physiology and histology open before us, let us seek an answer to the three following questions: How are voluntary and involuntary motion to be explained? How is brain activity to be accounted for? How explain the phenomenon of memory?

That the fibers and cells of the brain and nervous system are the material elements concerned in the production of each of these phenomena, I shall not occupy your time in proving. How they do their work, how by their action and reaction the phenomena already named are produced, these are the questions that shall concern us.

To begin, therefore, let us study for a moment one of these single nerve fibers. If we were to dissect any part of the body under the microscope, we would find it filled with silvery threads of various size, ranging in thickness from one-fifteenth-hundredth to one-twelve-thousandth of an inch in diameter, the medium or average thickness being about one-six-thousandth of an inch.

These little threads are the nerve fibers. If you were to take the pains to examine one of them with a high magnifying power, and after it had been so prepared as to show its true character, you would find it to be made up of three parts: an outer structureless membrane; an interior layer of fatty matter; a central core or cylinder of albuminous matter. This central core, or "axis," as it is called, is the important part of the fiber, the two envelopes serving, so far as is known, no other purpose than that of a sheath for the protection of the delicate axis, and affording a means of insulating one fiber from another. If now you were to carefully trace one of these fibers from its outer terminus under the skin inward, to all appearance it would grow larger and larger as it approaches the nerve centres, just as the roots of a tree seem to grow larger as they approach the trunk, on account of the accumulation of smaller roots and rootlets. And yet if you were to examine more closely you would find that instead of uniting with other fibers, as it seems to do, each fiber remains separate from every other fiber and runs from its outer terminus inward, without uniting with any other until it reaches

the brain. And thus you see that each fiber is able to carry any impression that it may receive directly to the brain. If you were standing in the Western Union Telegraph Office in New York City, where there are scores of wires running out in every direction, and would suppose for a moment that each wire was put there for the single purpose of connecting New York directly with other points, you perceive that each wire would then bring its own distinct message. That from Chicago would bring one, that from Washington and Boston each another, and so on. Thus news could be sent from any part of the country directly to New York, because wires run from that city to every point. Now in something after the same manner, each nerve fiber carries its own sensation to the brain.

Those fibers having their outer terminus in the eye carry to the brain impressions of sight. Those terminating in the ear bring to the brain impressions of sound. If I touch my desk with a finger of my right hand, a certain nerve or set of nerves carries the impression immediately to the great nerve centre. If I touch it with a finger of the left hand, another set of nerves carries

the impression inward. And so with any part of the body; when any part is touched or affected in any way, certain nerves immediately transmit the impression to the brain.

Now it is important that you should remember that there are two kinds of nerve fibers: the afferent, or those passing toward the nerve centres, and the efferent, or those passing from the nerve centres.

It is important that you should distinguish between these, because the functions which they perform are vastly different. The afferent nerves are the nerves of sensation. All sensations are transmitted by means of the afferent nerves. If they were destroyed, all impressions would also cease to be given. You could then see nothing, hear nothing, feel nothing, in short could have no knowledge whatever of the external world; for it is on these afferent nerves, carrying as they do impressions from without inward, that our knowledge of the external world depends. But the efferent nerves proceed from within outward, and as we have already learned, perform a very different function. These are the nerves of motion. When I move my arm, or walk across the room,

or engage in any form of bodily activity, the motion is produced by these efferent nerves, and without them I would be capable of no activity whatever.

Well, now, let us examine the outer extremity of one of these afferent nerves, which we said was the nerve of sensation. Near its outer termination and immediately beneath the point at which the impression is given, the axis, or that part of the fiber which we said a moment ago was the essential part of the fiber, escapes from its sheath and divides itself into the minutest threads, forming a most complex network. These threads are so great in number, and so completely penetrate every portion near the surface of the body, that no part, however small, is untraversed by them. It is impossible to puncture the skin even with the finest needle without touching the expanded axis of some nerve fiber.

Let us now trace one of these fibers — say one from the finger here, inward. You will find it soon apparently uniting with other fibers as it approaches the nerve centre here in the spinal cord. Entering the spinal cord it touches a cell.

We shall speak of these cells further on. This much, however, ought at this place to be said, — the moment the nervous force set into operation by a sensation touches the cell, it is magnified or intensified, and is thus able to perform the work of stimulating more properly the efferent nerve with which it here comes in contact. Now the nerve that we have been tracing is, as we said, a nerve of sensation. It carries the sensation to the cell here. But notice here something else. From this same cell there runs an efferent nerve back to the muscles. This efferent nerve, you will remember, is the nerve that produces motion. You see that we have here now three things: the nerve carrying the sensation to the cell; the nerve of motion running from the cell to the muscles, and the cell itself.

Let us now see, if we can, how motion is produced by the action of this threefold mechanism. Let us say now, that inadvertently I touch my finger to the sharp point of a needle or to some heated surface. By that action a stimulus is given to the afferent nerve running to the cell. Here the stimulus, intensified by the cell, now stimulates in its turn the nerve running to the

muscles, causing them to contract, and as a result my hand is withdrawn. This is called automatic action, for you perceive that in the act of withdrawing my hand my will is not called into operation; that act is performed indeed before I am aware of it, and hence is called automatic motion, because it is motion independent of the will, and is to be explained by the spontaneous action and reaction of the nerves and the cells. And now at this point I am anxious that you should not overlook one thing, and that is the real manner in which this automatic motion is produced. What causes the automatic motion of my arm when inadvertently I touch my finger to a heated surface? You say it is caused by the contraction of the proper muscles. And when I ask what caused the muscular contraction, you say it was produced by some nervous force operating along the nerves that traverse the muscles, and thus the movement of the arm is caused by muscular contraction. This muscular contraction is caused by the nervous force operating along the nerve. And when I ask you what caused the nerve thus to act, you say it was caused by some stimulus. Now that is what I want you to remember. It was the

stimulus given to the efferent nerve that in some manner caused it to act; its action caused the contraction of the muscle, and this contraction produced the movement. The important thing, then, you see, is the stimulus; for when you have that you have all the rest. Well, now, if you bear in mind that the original cause of motion is this stimulus given to the efferent nerve, we are prepared to understand how voluntary action, as well as involuntary, is produced. For there is muscular motion that is not automatic. I can move my arm in any direction without the movement being caused by some sensation or stimulus given from without. I can move it by an act of will. See now how this becomes possible. Here is the motor nerve; and we have just learned that in order that motion in my arm be produced, this nerve must be caused to act, in other words must be stimulated. Suppose now, that instead of its being stimulated by means of some sensation brought from without through the afferent nerve, it should be stimulated from within along the track of some nerve running down here from the brain, motion again would result; for the thing necessary is simply to stimulate the nerve of

motion and the movement is produced. That nerve may be stimulated, as I have shown you, by a sensation from without, but it may also be stimulated through the nerves running down the spinal cord, and in either case you have motion. And thus you can see how it is possible for the will to operate upon the body. Affording as it does in some way a stimulus to the proper efferent nerves, it is possible for us to direct the motions of the body and to accomplish all of those movements which we call voluntary movements. Now it is not a part of our task at present, to define the nature of the stimulus by virtue of which voluntary motion is produced. It is sufficient for the present to show that such a stimulus is certainly given; and to call attention to the fact that without such a stimulus we could not possibly be capable of voluntary movement. Nor does the question specially concern us as to how it comes that so small a stimulus is able to produce a force so out of proportion to itself. For when my arm is moved suddenly, the force of movement is certainly many thousand times greater than the force of stimulation could possibly be; and yet if we remember that in the muscles themselves there

resides a vast amount of potential energy, and suppose that the effect of the stimulus is simply to liberate that energy, we can account for the vast disproportion between the energy given off as the result of a certain stimulus, and the intrinsic energy of the stimulus itself.

An illustration of this may be found in the steam-engine. As it stands there at the station ready for its journey, within its boiler there resides a vast amount of potential energy — an energy which if called out is able to move the train of a score of cars, each loaded with many thousand pounds of freight. But when the throttle is opened and motion is communicated to the machinery, the force that is now put into operation is vastly out of proportion to the force exercised by the engineer in opening the throttle; but as the opening of the throttle simply served to liberate the energy resident in the boiler, so does the stimulus given to the motor nerves serve but to release the energy resident in the muscles. The fact that such a stimulus is given, whether it comes from without, as in the case of automatic motion, or from within, as in the case of voluntary, this is the fact that we are now to bear in

mind, as well as the other, namely ; that the very small initial force required for the change is just as impossible to conceive without adequate cause as the whole force itself would be.

We come now to the cell.

Insignificant as the cell apparently is, we must not overlook it, for it performs several very important functions.

Two purposes are served by the cell. First, they unite the nerves at their inner termination. Secondly, they serve the purpose of magnifying the impressions given by the nerves. Suppose that I should touch very lightly a piece of velvet, or the down of a feather, the impression would be very slight ; I could not feel it, perhaps, if the sensation were not magnified or intensified in some way. Now this function is performed by the cell. It magnifies the faint impressions, whether made upon the nerves of sensation, or on the nerves running down from the brain to the motor nerves, and thus makes it possible for even the smallest stimulus to accomplish its work. Like the nerves, these cells are made up of three parts. The outside consists of a pulpy matter. Inside of this is a roundish body called the nu-

cleus; and still inside of this are often to be found one or more bodies called nuclei.

These cells range from one-three-hundredth to one-three-thousandth of an inch in diameter. Every nerve terminates in one of these cells. Now in tracing the nerve some time ago, we traced it only to the cell here in the spinal cord; but it did not terminate there. Crossing the cell it passed upward along the spinal cord to the sensorium. This is called the sensorium because all sense impressions are recorded there. There would be no sensation or feeling of any kind if the nerves did not reach this portion of the brain. For instance, if the spinal cord was severed here in the region of the cervical vertebra, there would be no sensation in any of the parts below that point. You might produce automatic motion in the parts below the point of lesion if you were to stimulate the proper nerves, just as you had before, but you could not have feeling. The sensorium is the seat of feeling. It is in it that the nerves from the ear, the eye, the mouth and the body all terminate. Had I a slate here and five of you were to write your different experiences upon it, the slate would serve the same purpose

for you that the sensorium does for the five senses. The sensorium is the slate upon which the nerves write their various impressions. Here the optic, the olfactory, the auditory and all the in-coming nerves record their impressions. But now suppose that after five of you had recorded your experiences on this slate, I should take it up in my hand, read over what you had written and meditate on all the facts recorded. Suppose that I should arrange these facts into some system; notice the bearing of each on the other, and draw conclusions out of them, then I would perform the same labor that is performed by the cerebrum. Looking down, if I may so speak, on the record as made by the senses on the sensorium, just as I would look at the writing on the slate, the cerebrum takes up these facts one by one, and shapes them into ideas. The cerebrum, then, is the seat of thought and ideas, just as the sensorium is the seat of feeling. But while the cerebrum is the seat of thought, it is evident that for the facts upon which it thinks, it is dependent largely upon the impressions given in the sensorium. And yet the cerebrum deduces facts and evolves ideas the basis of which were not given in the senso-

rium. We have thoughts, conceptions and ideas, the bases of which could not possibly have been furnished by the five senses. Let us see. Conceive for a moment that you knew absolutely nothing concerning the world that lies about you —you are blind and deaf, cannot taste, smell or feel. Conceive yourself as completely shut off from the external world as is Laura Bridgman, of whom you have doubtless read. Suppose now that by some means or other it were possible for five persons to inform you of all that could be seen and heard and tasted and felt in this matchless world of ours. One would tell you of all that could be seen — what a field of thought would be opened for your meditation, and how many ideas would come that you had never had before! Another would tell you of all that could be heard through the ear, of sound and melody and human speech, and so on until you had some conception of the entire range of human sensuous knowledge. What a field would be opened up to you! Now just the knowledge that you would receive were your friends to tell you of all that could be heard and tasted and seen and felt, is in reality brought to you by the five senses. Yet all this is empiri-

cal knowledge; and as in swift thought you this moment sweep the entire field of this empiric knowledge, you cannot but realize that it is but a part of what you really know. You have knowledge the basis of which even your five senses never brought to you, and no man can persuade you that your knowledge is circumscribed by the narrow limits of mere sense impressions. Whence comes your consciousness of freedom? Is there freedom in nature, and did you learn there that you were free? Whence comes your consciousness of responsibility? Did you learn that from nature? Is nature responsible, and if so, to whom? Whence comes your knowledge of spirit, of the unseen, and of God? This knowledge comes not through the senses. You never gained it through the eye or the ear, or through any other sense faculty. What, then, is the organ of this higher knowledge? It is almost universally conceded by writers on mental physiology, that the cerebrum is the seat of these higher, and indeed of all ideas.

Let me ask your attention now for a moment to an examination of the cerebrum, the seat of intelligence, and to a study of that organ by virtue of whose operation all thought is at all possible.

Immediately within the skull, from which it is separated by several thin membranes, lies that portion of the brain known as the cerebrum. It is terminated below by the cerebellum, and covers the sensorium, with which it is united by numerous nerve fibers. It is composed of two substances — the white and the gray. The white substance makes up by far the greater portion of the brain. If you were to examine this white substance under the microscope, you would find it made up of nerve fibers similar to those of which we spoke a moment ago. Above this white substance, lining it on the exterior, lies what is called the gray substance of the brain. This gray matter is a mixture of white fibers with cells. These cells imbedded in the white fibers, give to this substance its gray appearance.

In your study of any plate of the brain, you will notice that this gray matter is folded and furrowed; just as the glove which we wear follows the outline of the closed hand, running up here and down there between the fingers, so this gray substance covers and follows the white in all of its convolutions. It is easy to see that this folding of the gray substance gives it a greater extent of surface

than would be afforded did it simply conform with the interior of the skull. This cake of gray matter, running down here and there, folded as we have said, contains about three hundred square inches of surface. Its average thickness is one tenth of an inch, and it is nearly a compact mass of cells. It has been estimated that in the gray substance of a brain of average size, there would be two hundred millions of these cells. As every cell has at least two fibers attached to it, and often many more, we are safe in estimating the number of fibers in the brain at forty-eight hundred million. Now I said a short time ago, that the gray matter, or external substance of the brain, was composed almost entirely of cells. But over this cake of gray matter, following it in all its foldings, lies a thin network called the pia mater. This network is made up almost entirely of blood vessels, by means of which blood is carried to the fibers and cells. This network of blood vessels covers the brain so completely that every part of it is abundantly supplied with blood.

Well, now, you have before you the material organ concerned in mental activity. You have here the white substance, composed of fibers, the

cake of gray matter with its fibers and cells, and finally this thin membrane that carries the blood to every portion of the brain. Let us see now, if we can, how mental operations are carried on by the mutual working of these three things. All those who have studied philosophy are aware that galvanic electricity is produced from three substances — zinc, copper, and acid. When a piece of zinc is united with a piece of copper, and both immersed in acid, you have galvanic electricity as the result. Now if you do not carry that illustration too far, you will find in it an analogy that will help you to understand, in some measure, the probable working of these various parts of the brain in the processes of thought. Let the zinc represent the white fibers, the copper the cells, the acid the blood, and you will have what might be called a mental battery, which under the control of an intelligence back of it is capable of evolving thought, as the galvanic battery is capable of evolving electricity.

But you ask, Is there any proof for all this? Is there any proof that the fibers and cells of the brain have anything to do in the production of thought, or that even a remote analogy exists

between the production of electricity and the production of thought? I answer: Yes; with this qualification. Back of the galvanic battery there stands no intelligence; back of the mental battery there does. And yet, that the character of the thought produced depends in some measure on the condition of the organ, is beyond question. I suppose that you are well aware that what we call clearness and dullness of thought, depends largely on the condition of the blood. Let the arteries send vitiated blood to the brain, and mental activity will be impaired. Take an illustration. You are shut up in an illy ventilated and crowded room, the air of which has become thoroughly vitiated. In a very short time you lose the power to think clearly, a dullness comes over you, and your mind refuses to act as it does at other times. Go out and inhale for an hour or two the pure air; you now find that your dullness has left you, and that you can think as clearly as usual.

Now why did you lose the power of clear and sustained thought in the first case? The answer is, because of the vitiated state of the blood, resulting from the breathing of impure air. When

you went out, and the blood was rendered comparatively pure again, you could think again clearly. The blood that flows to the fibers and cells must be pure, or thought cannot be clear, incisive and sustained. Come back to our galvanic battery, and you will see the analogy between the production of thought and the production of electricity. Weaken the acid in the battery, so that it cannot act as it should on the zinc and copper plates, and the electricity produced is but small in quantity. Strengthen the acid so that it can act properly on the plates, and the electric current becomes strong. Vitiate the blood that acts on the cells and fibers, and that makes it possible for them to perform their functions, and you weaken the powers of thought. Reverse the process and the effect is also reversed.

We have now, I think, learned something of the probable manner in which thought is carried on in the cerebrum by the concurrent action of the fibers, the cells, and the blood, and are able at the same time to see upon what grounds the brain has been called the organ of the mind.

We now come to a very important fact, and I want to call your attention particularly to it be-

cause of the intimate bearing that it has upon the subject under discussion. I speak of "The localization of the cerebral functions." By this it is meant that in any certain mental operation, not all of the brain is brought into use, but only a certain portion of it. Only, if you please, that specific group of fibers and cells which in the brain is devoted to that specific purpose. That as each key in the instrument is used in the production of a certain tone, and is used alone when that special tone is required, so with the various groups of fibers and cells in the brain. In each group a certain function is located. That group of fibers and cells, for instance, which is brought into operation in the study of music, is a different group from the one used in the study of astronomy. The one brought into operation in acquiring a knowledge of mathematics, is a different group from the one used in the study of language, and so on. For every function of which man is capable, there is also somewhere in the brain a group of fibers and cells answering to it.

Suppose for a moment that one should set himself to the task of acquiring a knowledge of the Greek language. A group of cells and fibers,

many thousand in number, are brought into use. These constitute the receptacle of that special knowledge. And as he would go on to increase his knowledge of the Greek, the combination would increase in its number by the addition of still other fibers and cells that had been brought into use, something after this manner: When the meaning of a Greek verb would be learned, certain cells with their fibers would be charged with it. When the meaning of a noun would be learned, other cells with their fibers would become the receptacle, and so on. But if such an one were to study music, an entirely different set of fibers and cells would be brought into operation. And thus when any new acquirement is attained, some special group is called into requisition, and henceforth becomes the receptacle of that special knowledge. Just as each key in the piano is employed in the production of a certain tone, so each group in the brain is employed in its own specific kind of knowledge.

Perhaps that statement should be qualified somewhat. If each branch of our knowledge were entirely distinct from every other branch, that statement would be true. But such is not the case; and, inasmuch as no class of facts can be

said to stand distinct from another class, we may perhaps say that in cases where two thoughts are similar, the same group with some modification of its arrangement or combination is used in the contemplation of both. As the musician in the production of a certain chord will sometimes use keys brought into use in the production of other chords, so may certain cells and fibers of one group be used in connection with the fibers and cells of another group, and yet each group so far as itself and the specific work which it does, are concerned, stands distinct from every other. But see now the proofs upon which this doctrine of the localization of functions depends. It is based on three facts : —

The first is the fact established by Broca. He showed that lesion in the posterior part of the third frontal convolution of the left hemisphere resulted in aphasia.

It was in 1861 that Broca established that fact and proved that the faculty of articulate speech was located in this portion of the brain, and that a diseased condition of this part resulted in aphasia, or loss of speech.

Secondly, on the results of experiments per-

formed by Dr. Ferrier on the cortical substance of the cerebrum and other ganglionic centers of the brain. It was found by Ferrier that when an electrode of a battery was applied to certain parts of the brain, movements precisely similar to those of the living state could be produced. Expressions of emotion, of pain, the perfectly natural movement of any part, were all produced when the proper point in the hemisphere was touched; thus showing that each function has its locality.

Thirdly, it is a fact attested by the experience of every student, that when the mind having become wearied by intense application to any specific subject turns to another, a sense of relaxation is experienced. This could not be the case were the same groups used in the contemplation of both, and can only be explained on the supposition that in the investigation of one subject a certain group is brought into requisition, and that when the mind turns to another, the exhausted group ceases to be used and a fresh group is employed.

From these facts we are warranted in saying that, "There is no departure from fact or strong probability in assigning special and distinct tracks for the currents connected with each separate sensation, idea, emotion, or other conscious state."

But observe now that when such a nervous track has once been established, by the bringing into operation of a certain group of fibers and cells, then ever afterward the reproduction of the same idea, thought, or emotion, results when the same group is again brought into action. Thus we have what we call memory. In every act of memory the same group of fibers and cells, which in the first instance was employed in the thought, or conscious state, is but again brought into operation.

Suppose that, to-day, you for the first time become acquainted with a certain fact of history. You learn, for instance, that on the first, second and third days of July, 1863, the Battle of Gettysburg was fought, with Gen. Mead in command of the Federal, and Gen. Lee in command of the Confederate forces. You learn further that the losses on either side were a certain number in killed, wounded and missing. Now in the acquirement of that information certain fibers and cells were brought into use, and a certain nervous track established. If now, after long years, you wish to recall these facts, how do you do it? I reply: By bringing those same cells and fibers into action

which were employed when the information was being acquired. The moment they again act, there is brought before the mind the facts which you wish to recall and of which they were made, as it were, the especial receptacle. Strike a key of the piano. It gives out a certain sound. When the piano was made by the mechanic, the wire corresponding to that key was constructed so as to give out that sound and no other, and thus whenever you strike it, it gives out precisely the same tone. Stimulate a group of fibers and cells that has once been employed, and it gives out the thought or experience with which it was originally charged. Stimulate it again, and it gives out the same thought or impression. Stimulate it again, after long years have intervened, and it gives out the same thought still. That is memory. For every new acquirement, then, I bring into use a new combination of fibers and cells; and in each act of memory I only cause them to act again, and thus I have brought before me once more the fact, a knowledge of which was once gained and which I now wish to recall. The action of these fibers and cells reproduces it, just as the wire in the instrument always reproduces the same tone. I

remarked at the commencement of this discussion, that as an examination into the structure of the piano, an inspection of its wires and keys, their action and relation, would help us to understand how music is produced when the keys are touched by the musician, so also would an examination of the brain with its intricate mechanism, let us into the secret of how action and thought might result when its groups of fibers and cells are brought into action. For the brain also is an instrument upon which something plays, as the musician does on the instrument. I think, therefore, that we are not going too far when we say that an explanation, adequate at least in some degree, has been made of the instrument concerned in the production of action and thought. We have seen how that either may result when the appropriate fibers and cells are brought into operation, and have learned how that in their reaction, memory finds its explanation. Thus we have examined the instrument; we have seen how both physical and mental action are brought about when these delicate groups are brought into play.

But mark: The great problem still remains unsolved, for it is one thing to explain the instru-

ment, it is quite another to point out the musician whose existence is as much a necessity for the production of melody as is the instrument. We have seen what the result would be if certain keys of the cerebral key-board were touched; but we have not yet accounted for the melody, inasmuch as we have as yet failed to explain the manner in which these cerebral keys are touched in the production of action and thought and memory.

It is clear that if certain nerves are stimulated, voluntary and involuntary action will follow. It is clear that if certain groups of fibers and cells are stimulated, thought follows. It is equally clear that if groups having once been brought into action in the attainment of any acquirement are again made to act, the result of that action is memory. But how now are these fibers and cells stimulated, and what is it that stimulates them? These, let me ask you to bear in mind, are the supreme questions. In getting an answer let me ask you to come back once more to our illustration in the instrument. There are two ways in which sound is produced from the instrument:

The first is by some foreign substance acting on and depressing the keys. A weight or a book may

fall upon the key and a tone be produced as the result.

The second way in which sound may be produced from the piano is by the depression of the key by the finger of the musician. Just so with this complicated instrument out of which action and thought come. Its keys also may be caused to act in two ways: first, they may be stimulated by some external impression. I may feel something, I may hear something, I may see something, and by this the fibers and cells may be stimulated and thus caused to do their work, yet all that is but the foreign substance that presses the key of the piano. It is possible for me to shut my eyes, to close every avenue through which any sense impression can come, and by the action, not of that which is without, but of something solely from within, stimulate these nerves and fibers out of which thought and action come. Aye, it is in such moments as these, when with the external world shut entirely out and every avenue along which external impressions can come effectually closed, that the loftiest and the sublimest thoughts come as it were like an inspiration. Granted that the cerebral keys are stimu-

lated by external impressions, then I ask, What stimulated them when no external impression was present? For, mark you, these keys must be stimulated, and without a stimulus neither physical nor mental action can result.

You may have tone by permitting the foreign substance to fall upon the key of the piano, but you cannot have melody. For the soul-stirring melodies of a Mozart or Beethoven the keys must be swept by the fingers of an intelligent musician. So, likewise, you may have action, physical and mental, as the result of external impressions affecting the keys of fiber and cell. For, observe that anything that causes them to act, also causes them to perform their special functions. But consecutive, intelligent, profound thought, you can have alone as the keys in the brain are touched by an intelligent musician. You perceive that we are now brought face to face with our former question, namely, Is there something that plays on the fibers and cells of the brain as the musician does on the instrument? You will all agree with me when I affirm that it is possible for us to direct our thoughts, but do not overlook the fact that that admission is of immense consequence here.

You say that a man is responsible for his thoughts, and all the world agrees with you in the assertion. We can think of what we choose. By the operation of our wills we can concentrate our recollection upon a certain event and search out its details, along with all its collateral circumstances, to the exclusion of everything else. But if we can think of what we choose, then it also follows that we can bring into operation any group of fibers and cells according as we wish. For illustration: if I wish to think of some fact connected with the Greek language, I must use a certain group of fibers and cells. If I turn my attention to music, I bring that particular group into operation which is the storehouse of my knowledge of music; and so on. The fact, then, that we can think of what we choose, proves that we have power to set any group into action; for without their action we cannot think. And now I ask again the question, Is there something within that plays on the fibers and cells as the musician does on the instrument? It is self-evident that the key on the instrument yonder cannot depress itself. There is something to depress it, or there can be no sound. But if the key of the instru-

ment cannot depress itself, but needs the finger of the musician to produce from it its tone, so neither can the keys of fiber and cell depress themselves. They also need the finger of the intelligent musician. What you may call this invisible musician is a matter of small consequence. You may call it the soul, you may call it the ego; but that such an agent is present is beyond question. For if melody proves the presence of a musician to touch the keys that are in harmony, then thought proves the presence of a musician to touch the cerebral keys that also are in harmony. And if melody proves that the keys of the piano are touched, so does thought prove that there is something that plays on the brain as the musician does on the instrument. There is then something that depresses the fiber and cell keys of the brain.

But what now is this something? My friends, to speak of this agent that stimulates the cerebral groups as a material something, a force analogous to electricity, is nothing short of downright foolishness. To assume that position is to betray a lamentable ignorance of two facts, either of which is fatal to such a hypothesis.

First, The nerves are without insulation. For

this reason they afford no conduction for the electric currents, and experiment has proved that electricity applied to them, instead of following along their course, distributes itself throughout the body.

Secondly, This stimulus acts as no mode, or form, or mood of physical force acts. From these facts it follows that that something by which the stimulus is given, cannot be a material something.

But we may go one step further, and affirm that that something is intelligent. As the musician selects those keys which are in harmony, so does this something use one group in preference to another in volitional thought. This something therefore exercises choice. I ask now the metaphysician, What is the highest attribute of an intelligent being? He answers, Choice; the power to choose one thing in preference to another, the ability to weigh and decide in favor of one thing over against another. But if choice is an attribute of intelligence, then is this invisible something, this unseen musician, intelligent. We have then two facts which are scientifically certain:

First, There is something that plays on the fibers and cells of the brain, as the musician does on the instrument.

Secondly, That something which corresponds to the musician is intelligent.

But if there is an invisible, intelligent something that plays on the fibers and cells of the brain, as the musician does on the instrument, then that something must be independent of these fibers and cells, as the musician is independent of the instrument.

Standing, then, upon those two propositions, first, that there is something that plays on the fibers and cells of the brain as the musician does on the instrument, second, that that something is intelligent, I can look through the clouds which are soon to encircle me and catch a glimpse of the beyond.

What though I shall drop my body as I enter the shadow? I shall drop it as the butterfly drops the chrysalis. If the soul plays on the fibers and cells of the brain as the musician does on the instrument, then it must be independent of them as the musician is independent of the instrument. And if the destruction of the instrument cannot be the destruction of the musician, because he is independent of the instrument, then the destruc-

tion of the body is not the destruction of the soul, because it is independent of the body.

"The world recedes! it disappears!
Heaven opens to my eyes! — my ears
With sounds seraphic ring:
Lend, lend your wings! I mount! I fly!
O, grave! where is thy victory?
O, death! where is thy sting?"

# THE SPIRITUAL BODY.

What if the earth
Be but the shadow of heaven and things therein
Each to the other like, more than on earth is thought?

— MILTON.

There is a spiritual body.— PAUL.

# THE SPIRITUAL BODY.

SCIENCE and revelation alike testify that the present visible universe with all that belongs to it shall at length be dissolved. There will come a time when the sun shall have burned itself out; when the moon, having grown old, shall fail to make her nightly journey through the sky; when the stars, one after another, shall grow dim and then go out forever; and when the earth with its mountains and its seas and all that belongs to it shall cease to be. The time will come when —

> "The cloud-capped towers, the gorgeous palaces,
> The solemn temples, the great globe itself,
> Yea, all that it inherit, shall dissolve;
> And, like this unsubstantial pageant, faded,
> Leave not a rack behind."

It is in such a world that man finds himself, with nothing around him that is permanent, with everything hastening to its dissolution. And yet face to face with a dissolving universe, man has

always stood firm in the conviction that he is an exception to the universal order. Amid the perishing, he has ever clung to the thought that he at least is immortal.

Near four thousand years ago, sitting in his tent door, conversing with his three friends, Job spoke his belief in his immortality: "Though after my skin worms destroy this body, yet in my flesh I shall see God. Whom I shall see for myself, and my eyes shall behold and not another."

Those who have moulded the thinking of every nation, both ancient and modern, have taught that man is immortal. Homer sang it into the hearts of the Greeks, and Socrates put it into their philosophy. Confucius taught it to the Chinese, and Zoroaster to the Persians. In the religious books of India we find this prayer addressed to the great Soma:

"Where there is eternal light, in the world where the sun is placed, in that imperishable, immortal world, place me, O, Soma!

"Where life is free, in the third heaven of heavens, where the worlds are radiant, there make me immortal. Where wishes and desires are, where the bowl of the bright Soma is, where there

is food and rejoicing, there make me immortal. Where there is happiness and delight, where joy and pleasure reside, where the desires of our desire are attained, there make me immortal."

The Indian in the early wilds of America had also his rude ideas of a world beyond. Far off to the west, where he saw the sun set, beyond a dreadful deep and rapid stream over which from hill to hill there lay a narrow, slippery passage, there were the delightful hunting grounds. In the frozen zone the Greenlander talks of a land where perpetual summer reigns, where all is sunshine, and there is no night; where good water and birds and fish and reindeer are, without end. The way to this delightful place is down a frightful precipice, all stained with the blood of those who have gone down before; and if, perchance, this precipice is descended in winter or in tempest, and the soul do but slip, it perishes utterly.

And thus in all ages and among all nations man has believed in his own immortality; and though he has seen the perishable nature of everything around him, he has ever experienced an inner certainty that to the universal order he at least is an exception.

Nor has man come into the possession of this belief through tradition. Wherever and whenever he has sat in confidential communion with his own soul he has heard it speak to him of his immortality. But simple and cheering as this conviction is when possessed in its native purity, as a result of certain phases of modern speculation and so-called scientific thinking, it has come to lose much of its significance.

To the mind unbiased by false systems of thinking, a future life has always meant a continued existence of the self-conscious individual. It has demanded that as in this life man is in the possession of a self-conscious and an individual existence, so must he be in the future. Disrobed of all that hinders and limits him here, like the butterfly that shakes off its chrysalis and then rises into a higher and freer state, so man, freed from the limitations arising out of his association with his present tenement, shall come into a freer and higher existence, yet retaining his personal identity. It is needless to say that a conception such as this is alone able to satisfy our ideas of a real immortality, and, answering as it does every hope and longing, it alone is comprehensive.

And yet, in the discussion of the subject before us, it will be necessary to take a hasty glance at two other conceptions that now set themselves as rivals to this in modern thinking.

The first is the one offered from the side of the materialist. Man's immortality, according to this conception, finds its basis in the conservation of matter. Long ago it was discovered that matter is imperishable, and the law of the conservation of matter established as a fact of science. When a mass of matter was changed from one state into another, as is done when a piece of mineral is changed from the solid into the gaseous form, it was found by the use of the balance, that no particle of it was lost. The weight of the gas was precisely equal to the weight of the mineral out of which it had been evolved; and although its form was changed, yet no particle was destroyed. Numerous experiments with matter in its various states have confirmed the fact that by no process at the command of man can matter be altered in quantity, or annihilated. By heat and pressure it may be changed from one state into another; a solid may be changed into a liquid, a liquid into a gas; the process may be reversed, and yet

the amount of matter abides the same precisely in quantity.

You have heard of the experiment performed by Faraday. One day a workman in his laboratory accidentally dropped a little silver cup into a jar containing acid. In a short time it disappeared. Among the inexperienced chemists then working under the direction of the great scientist, the question was discussed whether the cup could ever be restored. One said it could not; that being now dissolved and rendered imperceptible it was destroyed. In the midst of the discussion, Faraday entered the room, and learning what had happened, he put certain chemicals into the jar, and in a few moments every particle of the silver was precipitated. He lifted it out a shapeless mass, sent the precipitate to a silversmith, and the cup was restored. And thus by various processes known to the chemist, the form or state of matter may be changed. A silver cup may be dissolved, held in solution, become invisible, but in no case can matter be destroyed. Well, now, when this law of the imperishability of matter was discovered, materialists at once took it up and said, "This will explain man's notion of immortality;

matter is immortal." "In the material of his present body man finds the promise of his immortality. True, these material particles now existing in his body shall come into other relations. In the dissolution of the grave, these particles that now enter into the constitution of your and my bodies shall cease to exist in their present relation, and each molecule shall go out into the universe to enter into new relations; but then, the particles, the atoms, cannot be destroyed. Man is matter; matter cannot cease to exist; hence man as matter is immortal."

The defect in this view, you at once see, is that it denies to man a personal, individual immortality. Not as the ego that now is, shall man live on. Not as a person, retaining identity; but in a million different forms — in plant and earth and air, neither of which can be self-conscious — the man who now is, is to live. To say that this doctrine denies man's immortality, is to utter a truth that is self-evident; for if we do not live on as individuals, we cannot be said to live on at all.

The second view is that which finds the promise of man's immortality in the persistence of the species. "The species," say the advocates of this

view, "must be forever perpetuated." "The individual may die, but humanity will still live on in the generations that shall come and go forever." Now it is a wonderful truth, and fatal, if you please, to the theory of evolution, that species are persistent. The mollusk that suns itself on the ocean beach to-day, is identical with its sister of the same species, that lived on the shores of the once almost shoreless ocean. Practically, in species there is no variation.

When the ancient Egyptians embalmed their dead, they put with them seeds, which now for five thousand four hundred years have retained their vitality. And these, when taken out of their sepulchers and planted to-day, spring up into plants, the flowers of which in color and every feature, are identical with those that now make up the flora of the Nile valley. The plant imbedded in the sedimentary deposits more than fifty thousand years ago, presents no differences from the same species that now bloom in our valleys and gardens, and man is the same in posture and in visage, in mind and in power, that he was when first he walked the earth. It is true that the species are persistent, immortal. But fatal as that

fact must be to a theory I need not name, yet in it man is asked to look for his immortality. And when this fact of the persistence of the species was demonstrated, it was said in some quarters, "Here is the solution of the problem of the future life." "Man as man shall live on forever. The individual shall die, but the species will remain. In the perseverance of the species, therefore, man is to look for his immortality."

It is said that on the shores of the Dead Sea, on verdant trees, there once grew most beautiful apples. Incrusted by the salt of that salty air, they were gradually transformed, and though retaining their natural color and appearance, they at length became a mass of stringent salt. Attracted by their beauty, the traveler would hasten to the spot, press the seeming fruit to his lips; but instead of the satisfaction promised, it crumbled into ashes and bitterness. And so with the view of immortality just presented. Attractive as it may seem when first contemplated, to the soul longing for a life beyond, it affords but the most bitter delusion. What though the species do live on? If the individual is lost, there can be no real immortality. In either of these views the inspiration

that comes out of man's belief in a future life is wanting. Life is robbed of its sublime significance, indeed becomes empty and meaningless. Nothing short of the perpetuity of the individual, and possessed of his self-consciousness, can be made to answer not only our higher hopes, but also our rational conceptions of what a continued existence for man must be. Real immortality must be the immortality of a personal life.

Well, now, we have gone far enough to see the one single requirement to which every true conception of man's immortality must of necessity answer. Every true conception of immortality must embrace in it personal identity. The individual of the future must be one with the individual that is now. He must be recognized as the same person, and as the same person he must be able to recognize himself. As we unhesitatingly affirm ourselves as one with the individual which in any moment of the past we recognized ourselves to be, so, in a future state, must each one be able to identity himself as the same individual that existed here.

It follows, then, that this identity is to be tested and proven first of all by memory.

See how this comes. We are now certain that we are one with the individual who by our name and in the possession of our individual consciousness lived years ago. And yet in the case of the aged man, a thousand changes have come; a thousand scenes have passed; the years have come and gone; youth has come and gone; Life's winter has been reached, and the frail form now leans on the staff of old age. And yet that man recognizes himself as the same one who once as a boy, played with his companions on the hillside, in the meadow, and beside the brook, now seventy years ago. But how comes he to recognize that fact, and how does he prove it? Is it because he finds himself in the same environment? It cannot be that. The objects which as a boy he knew, are perhaps no more. Every landmark has changed. Perhaps he is even far removed from the place in which his childhood was spent. Does he recognize himself as the same individual by his body? In the worn-out frame that now is, no man could recognize the child that once played so buoyantly. And yet there is something in that man which connects the present with the past, and enables him to affirm himself to be the same. It is memory.

Take that away, and no man could be certain that he is the same individual he once was. Through all the physical and psychical changes that have come and gone, through all circumstances, memory has continued, connecting his present consciousness with his past; and thus, though now an aged man, he recognizes himself as the same individual. It is memory that assures him of his personal identity. It must therefore be that if in the future life we are to recognize ourselves as the individuals now in the present, such recognition is to be had by virtue of memory; it is memory alone that can bridge between the present life and the future.

But in order that the identity of the individual be conserved, character and disposition must also be perpetuated. If, for instance, a radical transformation of character and disposition were in any wise to be effected, then could not the individual in the future life either recognize himself or be recognized as the individual that existed here? Very long ago Socrates saw and gave utterance to this truth. "There is a tale, Callicles," says Socrates, "which I have heard and believe, from which I draw the following inferences: Death, if I am right, is in the first place the separation from

one another of two things, soul and body ; this and nothing else. And after they are separated they retain their several characteristics, which are much the same as in this life. The body has the same nature and ways and affections, all clearly discernible. . . . And in a word, whatever was the habit of the body during life, would be distinguished after death, either perfectly or in a great measure, and for a time. And I should infer that this is equally true of the soul, Callicles."

And now with these facts before us, each of which I deem to be self-evident, we are brought to see the necessity of a something by virtue of which all this may become possible. We are brought to see that no discussion of the question of man's immortality can be thorough or comprehensive in which the matter under discussion is ignored. In short, we are led to the conclusion that a spiritual body is a postulate of man's immortality. It may perhaps be, that with some, and from the theological side, the question of man's immortality may be discussed separately and without reference to that which such immortality of necessity implies. But it is not so when we come to its discussion from the scientific side.

Considered from this, immortality demands the existence of an organ, in other words, a spiritual body. The one is a postulate of the other.

Indeed, it would seem that even Paul was unable to discuss the one without reference to the other. In the fifteenth chapter of First Corinthians, in his treatment of the resurrection and our future existence, in order to dispel certain objections, he finds it necessary to throw into the midst of his discussion, in order to explain the possibility of a future life, the expression, "There is a spiritual body." In his judgment, without the statement of that fact, the doctrine of the resurrection and a future life could not be understood. It comes, therefore, that alone as the presence of a spiritual body now resident in man is admitted, can this immortality be proven.

Let us now see how this appears. We have just been saying that immortality implied personal identity; that the person in the future life must recognize himself as one with the person that is now. We have also just seen that this identity or oneness of the individual in both states is to be tested, first of all by memory. But that being the case, a spiritual body follows as a necessity.

For how are we to explain the continuance of memory when we have ignored or denied the existence of a spiritual body? Memory implies an organ, an organ on which impressions whether physical or mental have been recorded. For, observe that physiological science has established the truth that our recollection of past events is dependent on certain traces left behind on some enduring substance hid away in the cerebral regions; that each thought we think is accompanied by certain molecular displacements or motions in the organ of the mind, and that these are in some way stored up in that organ so as to produce what we call physical memory. That without such an organ connecting the individual with the past, no one could possibly have memory on the one hand, or a conscious individual existence on the other. The necessity, therefore, of a spiritual body or organ, some durable substance connecting the individual of the future state with the individual of this, becomes apparent. And thus you see that in every comprehensive discussion of man's immortality, the question of the spiritual body cannot be ignored. In view of this fact, two questions, far-reaching in their importance, are before us.

First, Is man in possession of such a spiritual body?

Second, What is its nature and character?

Take the first. Is man now in possession of a spiritual body?

You know it is sometimes said "that the writers of that Book whose doctrines and whose precepts many of us have learned to love, were not philosophers, were not men of science." We never get through hearing of "the ignorant fishermen" whom Jesus picked up on the Sea of Galilee and made of them disciples. Often has it been more than insinuated that superstitions and groundless fancies common enough among fishermen, have crept into the sacred Word, and because found there, are believed by the ignorant who call themselves disciples of the Nazarene.

Against the statement made by Paul, "There is a spiritual body," the same objection has been urged. Was it not a mere notion of his own? Was it not a superstition current among his own class, and which never had and never can have foundation in fact? So some have talked of the spiritual body.

But, my friends, it is a truth which in these

times ought not to be lost sight of, that one by one these so-called superstitions of the Galilean fishermen, as men have come to understand the universe better, have also come to be recognized as facts in science. And if they were ignorant, then it must now be admitted that they always spoke better than they knew. It is true that these men did not pretend to be men of science; but it nevertheless remains that they somehow understood matter and mind and force as no man has understood them since. It has been a long and weary march, but out of the darkness and into the light we are gradually moving on and up to where the disciples stood, and our conceptions of the universe are gradually becoming identical with those that the disciples held. Scientific men are coming nearer to the unseen to-day than uninspired men ever came before; and the reality of that unseen, and its connection with the seen, are no longer disputed. It is Shakespeare who makes Hamlet say: —

> "There are more things in heaven and earth, Horatio,
> Than are dreampt of in your philosophy."

To the truthfulness of that statement, Science,

with a profounder veneration then ever before, nods its assent. And yet I shall not ask you to take the statement of Paul, in relation to the spiritual body, as final. Apart from Scripture, there are two very conclusive proofs of its existence. The first of these may be termed the psychical.

It is a fact revealed in every man's consciousness that, through all physical changes he retains his personal identity. Now, Science tells us that within a certain fixed period, not more at most than seven years, every particle of the body has been eliminated and other particles substituted. In other words, within this period these physical bodies of ours undergo a complete and radical change. Every particle of every tissue in this period is transformed ; not a cell or corpuscle, not an atom of bone or nerve or muscle or brain fiber or connective tissue, is the same at the close of seven years as entered into the framework of the body at the commencement of that period. No particle of the body of the child at seven years is the same as that with which it began life. It follows, then, that in the case of the youth of fourteen years, every particle of his physical system has

twice changed and given place to others. At twenty-one this change has been thrice effected; and in the case of the one who has reached the age of seventy, this change has been effected no less than ten times. At seventy years a man has, therefore, been in possession of ten different bodies, each entirely separate and distinct from any of the preceding. The change that goes on, finds its illustration in the various characters assumed by the player in the theater. In a particular scene, in the impersonation of a certain character, a certain garb will be assumed, while in another scene under a different garb, an entirely different character is represented; and so on during the course of the play. Changing his costume to suit the characters he aims to represent, a single player will, to the eye of the uninitiated, appear to be as many persons as the characters he has assumed. But to the initiated the identity of the person in each of the characters is apparent. The external may have changed, the tone of voice may have varied, the attitude and gesture may have been different, and yet back of each character stands the one and the same individual actor. It is so with man during the course

of a long life. The physical may change ; no atom of the body may remain the same ; and yet through it all, he recognizes the certain truth that he is still the same person. But now the fact that each individual knows himself to be one through all these changes, and recognizes that his identity through life is a certainty in spite of the flux of the particles of the body, points us to something in him that has remained the same through all the changes. Beneath the matter that has come and gone, a something has persisted, and, by virtue of this, man recognizes his identity and is able to affirm in spite of the fact that every particle of his visible and tangible body has changed, that something has remained, and that that something is himself.

It is certain, therefore, that this something which has endured is not the gross matter of his body. It is not this that has remained unchanged, but something back of this ; a something not subject to the laws that govern ordinary matter, neither indeed can be. And thus out of man's consciousness of personal identity comes an argument for the existence of his spiritual body : a something within man that continues

through every change; that cannot be base matter as we know it, and that by virtue of its persistence, enables each of us to affirm our identity. Take away this something; leave nothing but the base matter of the physical body, and no man could affirm himself, after a period, to be the same individual that he once was.

But I desire to call your attention to another fact, and to another proof for the existence of the spiritual body. It may be called the physiological. A few moments ago I called your attention to it in an incidental way. Among those who have the best right to speak, it is stoutly held that mind must also have its organ; that without a substance of some kind, upon which mental and sensuous impressions are made, conscious thought could not be. It is likewise a settled question in mental physiology, that memory implies and demands such a substance. If you journey yonder on the shores of the Nile, you will find monuments covered with inscriptions. The deeds of heroes and the annals of empires long since passed away, are traced there upon the imperishable rocks, and men to-day, studying out the meaning of those strange characters, read

the history of nations that are no more. Those rocks bearing those inscriptions connect the present with the past, and stand there as history's organ of memory. Destroy these rocks, and with them perishes the knowledge traced upon them. Just so it is in the case of memory. Without some substance back of the mind upon which impressions may be traced and knowledge recorded, memory could not be; for it is alone as the mind reads these impressions, long since made on this enduring substance, that it becomes possible to recall past events, or to retain knowledge that has once been ours. Now observe that it is in this way modern physiological science feels itself compelled to account for the fact of memory, and in this way does it explain our power to recall the past and to retain knowledge of which we have once come into possession.

You see, then, that memory implies two things. First: It implies an organ upon which impressions are made. Second: It implies the conservation of that organ. For when the organ perishes it must be clear that the ability to recall perishes with it.

And thus we have two very important and

significant facts bearing on the question of the existence of the spiritual body in man. It is certain that this organ upon which memory is dependent, cannot be made up of the gross matter out of which the tangible fabric of the body is built, for if this were the case, it would not persist. It would then be subject to the laws that govern the gross matter of the body, and, inasmuch as this matter is gradually giving way and being replaced by other, it follows that, after a period of seven years, it would be impossible for any one to recall anything that had taken place prior to that period. And yet we are certain that the reach of memory is not thus circumscribed. Memory knows no time limit. The man of seventy years recalls the scenes and the incidents of his youth as readily and as accurately as those of yesterday. It must, therefore, be that the substance or organ belonging to memory has been conserved. Amid the repeated changes of every material particle it must have held its place. It cannot, therefore, be of a nature the same as the gross matter of the body. It cannot be matter as we know matter, but must be something spiritual and unchangeable in its character.

And thus, when man has come to look closely into the facts of his own consciousness, he has come to recognize the necessity of a spiritual substance or body, in order that he may interpret the facts of consciousness as they exist. He has found himself in the possession of a consciousness of personal identity. He has found himself in possession of memory, and, driven to account for these facts, he has found the existence of a spiritual body as necessary to their solution.

But we come now to our second inquiry: What is the character and nature of this spiritual body?

It is very manifest that such a body is now resident in man. But its character is not so easily determined as is the fact of its existence. And yet we shall not look in vain even into the question as to its character. But you must not be surprised if it is said that this body of which we have been speaking is material in its nature. You know that Herman Ulrici, who has looked into our question more deeply than any other of whom I have knowledge, spoke of the spiritual body as "a perfect fluid." He conceives it "as similar to the ether, only not like the latter con-

sisting of atoms, but absolutely continuous, and that this fluid extends out from a given center, permeating the whole atomic structure of the body, operating instinctively and in coöperation with the vital force."

I am aware that in the minds of many there exists an almost instinctive aversion to every attempt at the materialization of that which we have always conceived as the immaterial within us. And yet it must be admitted that much of our prejudice arises out of the fact that we have studied matter altogether in its lower and baser forms. When the term matter is used, at once there come before the mind conceptions based upon our knowledge of matter in its lower forms. We think of weight, of inertia, and the like, as the essential properties of matter; and imagine that the only forms in which matter can exist are the forms which it assumes in earth and water and plant, and the various objects which make up the visible and tangible world.

We say that weight is an essential property of matter, and have long been repeating over and over to ourselves that "no two substances can occupy the same space at the same time." Of

course, if our conceptions of matter are such as these, if our notions of it have all been formed by our study of matter in but two or three of its forms, we shall have very grave objections to any theory in which the spiritual body is conceived of as material in its character. And yet it is very clear, in the light of recent investigation, that our ideas of matter must now be very greatly modified, and other conceptions that we have had, entirely given up. Indeed, by those who have studied most into its nature, it is now admitted that of the essence, character and possibilities of matter, we perhaps know less than we do of any other one thing. But this much is certain. The better we come to know it in its higher forms, the more evident is its independence of those laws and conditions which hitherto were supposed to control matter universally. In the language of Professor Crookes, matter, as we pass from the lower to the higher forms, more and more loses its ordinary properties and more and more "assumes the character of radiant energy."

Let me read here a few sentences from "The Life and Letters of Faraday," concerning the nature of matter in its higher forms. "If we

conceive," says Faraday, "a change as far beyond vaporization as that is above fluidity, and then take into account also the proportional increased extent of alteration as the changes rise, we shall, perhaps, if we can form any conception at all, not fall far short of radiant matter; and, as in the last conversion many qualities were lost, so here, also, many more would disappear."

"As we ascend from the solid to the fluid and gaseous states, physical properties diminish in number and variety, each state losing some of the properties which belong to the preceding state. When solids are converted into fluids, all the varieties of hardness and softness are necessarily lost. Crystalline and other shapes are destroyed. Opacity and color frequently give way to a colorless transparency, and a general mobility of particles is conferred. Passing onward to the gaseous state, still more of the evident characters of bodies are annihilated. The immense differences in their weight almost disappear. The remains of difference in color are lost. Transparency becomes universal, and they are all elastic. They now form but one set of substances, and the varieties of density, hardness, opacity, color,

elasticity and form, which render the number of solids and fluids almost infinite, are now supplied by a few slight variations in weight, and some unimportant shades of color."

You see, then, that as we ascend from the baser to the higher forms of matter, there is a gradual resignation of those properties which we commonly regard as belonging to matter. Weight is, at least in a great measure, lost. The property of impenetrability is lost, and it is even now admitted that matter in its higher forms may occupy the same space with matter in its lower. Do you say that that cannot be? Open Professor Tait's recent book on "Properties of Matter," and bear in mind that at present no one has a better right to speak of matter, its properties and possibilities, than he. The statement to which I specially call your attention is that in which he reviews the atomic theory as propounded by Boscovich. In his statement of the theory, Boscovich said that, on account of a peculiar law, no two atoms could be conceived as occupying the same space at the same time. To this last statement, Professor Tait objects in these words: "But this seems an unwarranted concession to

the vulgar opinion that two bodies cannot co-exist in the same place. This opinion is deduced from our experience of the behavior of bodies of sensible size, but we have no experimental evidence that two atoms cannot coincide." Now I want you to fix your attention on that last statement, because it will be of immense importance by and by when we come to study the spiritual body of Christ as it was revealed prior to his ascension. There is also a very significant passage in one of the lectures of the deservedly famous Dr. Thomas Young, to which I must also call your attention before we pass on. He is speaking of the different orders of being, and, in this connection, he says: "And of these different orders of beings, the more refined and immaterial appear to pervade freely the grosser. We know not but that thousands of spiritual worlds may exist unseen forever by human eyes. Nor have we any reason to suppose that even the presence of matter in any given spot, necessarily excludes these existences from it."

And thus we come to the conclusion, looking at the question purely from its scientific side, that the spiritual body may be material in its nature.

If matter in its higher forms may freely permeate matter in its lower, then is there no intrinsic improbability that the substance of the spiritual body may be material though it occupies space seemingly occupied by the grosser matter of which the physical body is made up. But that the matter of the spiritual body and that of the physical is the same in state cannot for a moment be admitted. Something of the laws that govern matter in its ordinary state we know. These, if governing the higher forms of matter, would preclude it from entering into the constitution of the spiritual body. But we are certain that matter in its higher forms is not under the dominion of those laws that govern it in its lower, nor does matter in its higher forms behave at all as it does in its lower. The substance, therefore, of the spiritual body, while doubtless material in its character, partakes also of the character of spiritual being by virtue of which it is very properly called "spiritual body."

But I ask you now to turn from the field of what may be called the merely conjectural, to that of the more positive knowledge of the spiritual body. I dare not say that only once, but I may positively affirm that once at least in history, a spiritual body

was seen here on the earth. I speak of the resurrected body of Jesus. Nor do I offer an apology for making reference to the resurrected body of Jesus, or for asking you to a scrutiny of that body as it appeared during the forty days intervening between his resurrection and his ascension. The time has passed when an apology was demanded for making reference to the great facts of the resurrection of Jesus in a scientific discussion. You know that De Wette was the leader of the acutest school of German rationalism in his day. So thoroughly did he set himself against the acceptance as truth of anything the verity of which could not be clearly established by the logical method, that he was called "the universal doubter." And yet it is De Wette who says that "the fact of the resurrection, although a darkness which cannot be dispelled rests on the way and manner of it, cannot itself be called in doubt." The fact, therefore, of the resurrection of Jesus stands side by side with the other well-accredited facts of history; and accepting it as such we have a perfect right to get what light we can from it even in a scientific discussion. But look at those facts for a moment.

On the morning of the third day the sepulchre

of Joseph of Arimathea is found empty. No man had seen Jesus go forth. No one knew what had become of him. Some time afterward on the way to Emmaus two disciples meet a stranger. For a time he journeys by their side, but they know not who he is. He afterward sits down with them to meat, and then for the first time, is the mystery dispelled, and in the person of the stranger the two disciples behold the resurrected Jesus.

Go back, now, to Jerusalem. The enemies of the disciples are vigilant. Rumors are afloat that the disciples are plotting insurrection, and every secret meeting is watched with suspicion. But there, in a little room with doors carefully locked to shut out any chance intruder, are assembled ten of the disciples. Every avenue of entrance or of exit is sealed and the disciples are congratulating themselves on their security. Suddenly Jesus stands in the midst of them ; the closed doors offer no barrier to his incoming. There he stands before the amazed disciples, recognized by all as their risen Lord. The account of what transpired is very interesting and significant. Naturally the ten are affrighted. The sudden appearance of Christ in his corporeal body, the recollection that in order

to preclude the entrance of any one they had closed and sealed the doors, but contributed to their fright in finding themselves thus confronted by a visible form. At first they thought a spirit was standing before them. Now notice the words of Christ: "Why are ye troubled, and why do doubts arise in your minds? See my hands and my feet, that it is I. Handle me and see, for a spirit hath not flesh and bones as ye see me have." Then he shows them his hands and his side; and, as though further to assure them of his identity, he ate a piece of broiled fish in their presence. Now I want you to notice four things:

The body that appeared to the disciples in that closed room was the same body that was taken down from the cross and entombed in the sepulchre of Joseph of Arimathea. You have the proof for that in the fact that as such it was recognized by the ten disciples; that body was no longer base matter, as we know it. Had it been such it could not have passed through the closed doors behind which the disciples had shut themselves; that body was not spirit, was not a mere apparition, but was substance. "Handle me and see, for a spirit hath not flesh and bones as ye see me have."

Though matter, the passage of Christ's body through closed doors can find its explanation alone in the fact of its being matter in its higher form, and brought into this form, out of the lower, by virtue of its contact with the spiritual.

Do you say that this passage through closed doors was miraculous, and that for this reason it can teach us nothing in regard to the nature of the spiritual body? My friends, that depends upon what you mean by the term miraculous. If, with Archbishop Trench, you hold that the true miracle is not the infraction of a law, but the neutralizing of a lower law for a time by a higher; if with you "the true miracle is but a higher and a purer nature, coming down out of a world of untroubled harmonies into this world of ours, for the purpose of bringing this back again into harmony with the higher; if in the miracle this world of ours is but drawn into a higher order of things, and the laws producing it are but laws of a mightier range and a higher perfection, though not contrary to natural laws," then was the passage of the body of Jesus through closed doors a miracle. In that act the lower laws governing base matter were held in suspension by the higher laws that hold in the realm

of the spiritual. But we do not for a moment admit that Jesus made use of any other power than that which belongs intrinsically to the spiritual body in order to pass through the closed doors. That act was an exhibition of the possibilities belonging to the spiritual body as being a higher order of existence. That power belongs to substance in its higher forms.

Turn back now and read again what Faraday said in relation to matter in its higher forms, and as you read it let me ask you also to bear in mind that it is now admitted that matter in its higher forms may occupy the same space with matter in its lower, hence may penetrate and pass through it. Here are Faraday's words: "The person who admits the radiant form of matter, will show you a gradual resignation of properties in the matter we can appreciate as the matter ascends in the scale of forms." Take, too, in this connection, the statement of Dr. Thomas Young: "And of these different orders of being the more spiritual and immaterial appear to pervade freely the grosser. . . . Nor have we any reason to suppose that even the presence of matter in any given spot necessarily excludes these existences from it."

Well, now, with these higher conceptions of matter and its possibilities, as taught by the acutest of scientific thinkers, does it seem to you to be an impossibility that the resurrected body of Jesus should be able to pass through closed doors, or that, though matter, it should be able to pass through matter? And, in the light of these facts, does it not rather seem that that act belonged to the category of possibilities belonging to the spiritual body, rather than that it was miraculous as some count the miraculous? My friends, that the resurrected and spiritual body of Jesus partook of the nature of the material cannot be held in doubt by one who carefully reads the narrative of his appearance. Those words forever stand against such a conclusion: "Handle me and see, for a spirit hath not flesh and bones as ye see me have." True, a spirit hath not flesh and bones, but a spiritual body has. Partaking both of the nature of matter and of spirit, though material on the one side it is not limited as is ordinary matter. The qualities of spirit have been communicated to it, transfiguring and glorifying it, so that through doors of brass or walls of adamant it can pass as readily as though these spaces were unoccupied.

Light as the desire that prompts, it can also mount upward, transport itself from place to place — the willing instrument of the spirit of which it is the organ.

And thus in our study of the nature of the spiritual body, as revealed in the manifestations of Him whose resurrection and ascension cannot be called in question, we get some conception of its real character and possibilities. But, you say, "There is a wide difference between the resurrected body of Jesus and the spiritual body resident in man. No part of that body was lost. Identically the same body, part for part and particle for particle, was raised, for no part of it saw corruption."

You ask, "Do you mean, then, to say that the body of Jesus in the very last moment preceding his death was a spiritual body, seeing that it was this body that was raised and that afterward ascended?" That is a very pertinent and yet a very difficult question. But if we are willing to submit ourselves to the lead of the profoundest and most far-sighted theologians, we shall find a way out of the darkness. Among the acutest of theological thinkers this is the view taken: that the body of

Jesus during his earthly ministry was like our own, corruptible, subject to the same wants, susceptible to the same conditions, and mortal; but that during his life of unsullied purity and contact with God, a gradual change went on, so that even that body once really material, became more and more spiritual in its character. By the leavening and transforming power of the indwelling spirit, the baser material was gradually eliminated, so that the processes of decay which in your case and mine must go on in the dissolution of the grave, for the elimination of the grosser material of our bodies, went on in the case of Jesus during life.

By virtue of unhindered contact with the spiritual, the corruptible gradually put on incorruption, the mortal gradually put on immortality, and, the material gradually giving place, was at length entirely merged into the spiritual body. At the moment of the ascension this transformation was completed.

Let me read here a few sentences that I have taken from the "Dogmatics of the great Danish theologian, Dr. Martensen": —

"All the four gospel accounts of the resurrec-

tion, seem to introduce two contrasted representations concerning the nature of the resurrected body of our Lord. The risen one seems now to live a natural human life, in a body such as he had before his death. He has flesh and bones, he eats and drinks; again, on the contrary, he seems to have a body of a spiritual, transcendental kind, which is independent of the limitations of time and space. He enters through closed doors, he stands suddenly in the midst of his disciples, and as suddenly becomes invisible to them. This contradiction which occurs in the appearance of the risen one during the forty days, may be explained upon the supposition that during this interval his body was in a state of transition and of change, upon the boundaries of both worlds, and possessed the impress and character of both of these worlds. Not until the moment of the ascension can we suppose his body was fully glorified and free from all earthly limitations and wants, like the spiritual body of which Paul speaks."

You see, then, that while in the estimation of this author there went on a gradual change of transformation of the material into the spiritual, he confines the period of transition more particu-

larly to the forty days intervening between the resurrection and the ascension, and holds that such a transformation was not completed or the spiritual body perfectly revealed until the moment of the ascension. Not so, however, with the early church. The view then prevailed that immediately after the resurrection his body was the spiritual body of which Paul speaks, and it was very properly maintained that the sudden appearances and disappearances of the risen Saviour could not be explained if after his resurrection his body had not been spiritual.

But that this process of transformation, this gradual leavening of the material by the spiritual, went on during the life of Jesus prior to his crucifixion, cannot for a moment be held in question. No less an accurate thinker than Julius Muller, face to face with the facts of the transfiguration, admits that these facts cannot be explained except on the supposition that the change was already going on. Here are his own words: "Though the resurrection must be regarded as the turning point, when the glorifying and spiritualizing process in Christ's body began to approach its consummation in the ascension, we cannot limit the

process within those two events. It may have been going on gradually even before his death, without in the least deteriorating from the reality of his earthly body. There is one event indicating this in the Gospel history — I mean the transfiguration."

Well, now, let us put these facts together, in order that we may see what we have.

We have here in the case of Jesus of Nazareth, a material body. We have this body, under full contact with the resident spirit, gradually losing its baser material until the stupendous scenes of the transfiguration, the various appearances and disappearances, the passage through closed doors, and finally the ascension become possible. And yet, that that body, so far as it served as an organ, was immaterial, cannot for a moment be admitted; for to admit that would make the words of Jesus, "Handle me and see," and those to doubting Thomas, "Reach hither thy finger and behold my hands, and reach hither thy hand and thrust it into my side," of no meaning.

And now that such shall be the character of our spiritual bodies is a very necessary conclusion. Not indeed of the baser matter of the present

shall our future bodies be, but of the higher. Of the baser we shall be rid in the dissolution of the grave, but the higher we shall retain. What a life of complete fellowship with and indwelling of God did for the body of Jesus, the grave must do for us. But the body that shall be is now. The higher of the present shall be the substance of the future body. It is in the light of such a conception that the words of Paul in relation to the spiritual body can be interpreted. Speaking of the present body he says, "It is sown a natural body, it is raised a spiritual body." Plainly, in his conception, the body that now is is the body that shall be. "There is" (not there shall be) "a spiritual body. For we know that if our earthly house of this tabernacle were dissolved, we have a building of God, a house not made with hands, eternal in the heavens."

As Christ arose from the dead with a glorified body, the first-born among many brethren, so shall man, disrobed of the gross matter that now inswathes his true body here, come forth a spiritual body.

And right along here there lies a truth of immense ethical significance. We are told that,

in their unscientific way, the ancients, accounting for the brilliancy of the diamond, said that it was caused by the sunbeams that the diamond had absorbed. For thousands of years lying under the fiery gleam of the sun, there was imparted to these jewels a radiance which, retained somehow in their substance, accounted for their present brightness. And while in the case of the diamond the ancients were in error, they came very near a truth that has since become an established fact in science. For when Prof. Becquerel discovered the phosphorescent qualities of calcium sulphide and then attempted to account for its phosphorescence, it was found that certain substances have power of assimilating properties belonging to certain other substances, and by virtue of this power they are able to manifest certain phenomena not naturally belonging to themselves. Steel becomes magnetized in contact with the magnet and takes to itself properties not belonging to it before. Calcium sulphide, after exposure to the sun, assumes to itself a property that before did not belong to it and becomes luminous in the darkness.

And is it therefore an unwarranted assumption,

and without its analogy in nature, when we say that the same thing may go on in the case of the base matter now entering into the constitution of our bodies? Expose the matter within our bodies to free contact with Him who is spirit, and the result will be the assimilation of spiritual qualities and the elimination of the baser material. What went on during the life of Christ in the gradual elimination of the baser material and in the perfection of the spiritual body, within certain limits has gone on in man, and may go on in man still.

In the name of science it may be affirmed that what is taken from the flesh is given to the spirit, and what is taken from the spirit is given to the grosser flesh. It is certain that the consciousness of humanity, however it may be explained, bears testimony to that fact.

The judgment of mankind, were it uttered, would bear testimony that between the matter of the body of a Nero and that of an Elijah, there is the vastest difference in character. In the one, the higher and more spiritual assumed the character of baser matter. In the other, the baser material had gradually given place to the higher and the more spiritual.

There is a very significant passage in Archbishop Trench's book on miracles, that I must quote in this connection. You will find it at the close of the chapter entitled, "The Walking on the Sea." This is the passage: "In regard to this very law of gravitation, a feeble and for the most part unconsciously possessed remnant of his power survives to man, in the well-attested fact that his body is lighter when he is awake than sleeping." And this is the way he accounts for it: "From this we conclude that the human consciousness as an inner center works as an opposing force to the attraction of the earth and the centripetal force of gravity, however unable now to overcome it."

To the recent statements and their proofs that in certain states of moral trance the body is actually lighter than in those states we call normal, I need hardly call your attention. That field of science has not yet been sufficiently explored. And yet no less an authority than Prof. Crookes, gives it as his opinion that in certain states of moral trance the body is actually lighter than at other periods, and if this be the case he says further, "its causes must be natural." I do not share in the sneer in which some have indulged at this

statement of Mr. Crookes, that, "if the body in states of moral trance is lighter, the causes must be natural." For, my friends, we are coming to recognize the truth that there are no arbitrary lines separating the temporal from the eternal, the seen from the unseen, or the natural from the spiritual. We are coming to recognize that the one passes over into the other by natural, orderly laws. For one, I cannot but believe that, when matter in its higher states is better known, and when the effects on that matter in contact with the spiritual are better understood, we shall find it to be endowed with possibilities of which we do not even dream. Certain it is that even before the ascension, and even before the crucifixion, the body of Jesus manifested powers clearly belonging to the spiritual body. He disappeared; he walked on the sea; and as at Capernaum, so elsewhere the wonder of the disciples was expressed in the question, "Rabbi, when camest thou hither?" And on Hermon, in the hush and shadow of the midnight, he gave to the disciples an exhibition of his higher nature, in order to fortify their faith against the hour of his crucifixion.

It is true that by some all this may be set over

to the realm of the visionary. It may be said that this transformation of the material into the spiritual in contact with the spirit of God which we have affirmed as going on in man, is but an empty notion. It may so be; but I want you to observe that, by that judgment, you are left to account for the then unexplained fact, that by all men and in all ages these notions have not been regarded as visionary, but real. You have then to account for the persistence of a judgment in favor of which there never was nor can be a single fact.

Let those who choose deny these possibilities to the higher matter in contact with the spiritual in man. There are those who will not and cannot. And to these there is herein revealed a truth, in the light of which the translation of Enoch and Elijah, as well as the ascension of Christ, can be better understood. It can then be understood how that with bodies like our own, and by virtue of their walk with God, they were at length able to mount upward; how that the realm over which the laws that govern matter in its lower forms was gradually overstepped and transformed into the spiritual body, they could pass upward into the unseen.

I know that you will pardon me, if, in concluding, I ask you to look hastily at a certain deduction, which, while not belonging properly to the discussion, yet necessarily comes out of it. In our consideration of the spiritual body there has come unsought an answer to another question. I speak of the question of our after recognition.

William Cullen Bryant, in a poem dedicated to his departed wife, puts a question that you and I are constantly putting to ourselves, and to which we are ever seeking an answer.

For thirty years the wife of the poet had been the ministering angel of his home, and for ten had preceded him to the other side; amid the loneliness that was his he wrote and dedicated to her this poem: —

"How shall I know thee in the sphere which keeps
The disembodied spirits of the dead,
When all of thee that time could wither, sleeps
And perishes among the dust we tread?

"For I shall feel the sting of ceaseless pain
If there I meet thy gentle presence not,
Nor hear the voice I love, nor read again
In thy serenest eye the tender thought.

"Will not thy own meek heart demand me there,
That heart whose fondest throbs to me were given?
My name on earth was ever in thy prayer,
And must thou never utter it in Heaven?

"Yet, though thou wearest the glory of the sky,
Wilt thou not keep the same beloved name,
The same fair, thoughtful brow and gentle eye,
Lovelier in Heaven's sweet climate, yet the same?"

The answer to Bryant's inquiry we have had. In the body that now is, we find the body that shall be. Stripped of the defects and hinderances that inhere in its baser matter, retaining its higher material elements, the body that now is shall pass into the unseen.


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