

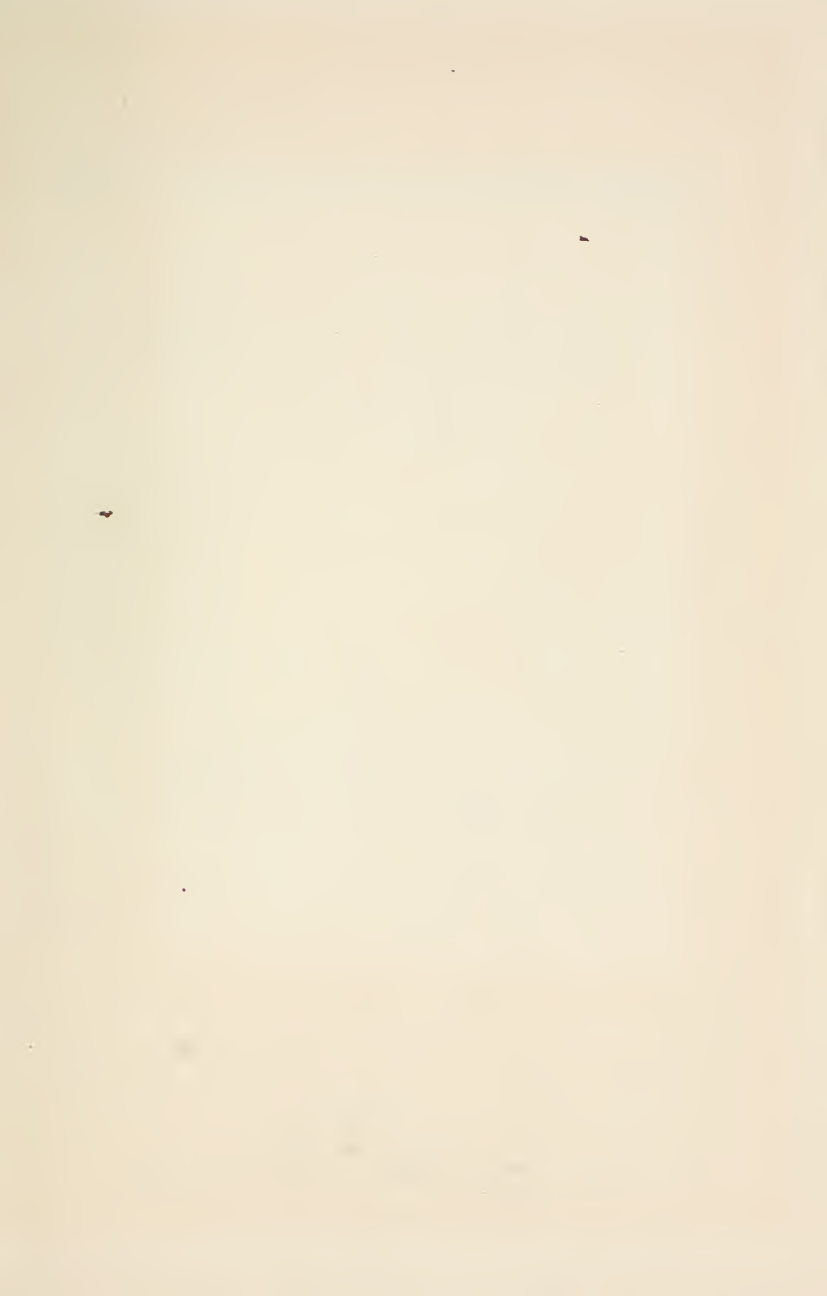
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LIFE, MIND, AND KNOWLEDGE

OR

THE CIRCUIT OF SENTIENT EXISTENCE

BY

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TO
PROFESSOR LLOYD MORGAN,
LL.D., D.SC., F.R.S.,
THESE ESSAYS ARE GRATEFULLY DEDICATED
IN RECOGNITION OF THE
"LIGHT AND LEADING"
RECEIVED BY THE AUTHOR IN
HIS GROPINGS FOR A MEANING
TO SENTIENT EXISTENCE.

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PREFACE

A LIVING organism is a closed circuit. The sentient current starts in the battery of living substance ; its "outer circuit" is consciousness, or mind, which, by functioning as *knowledge*, forms a "conductor" that closes or completes the circuit of sentient and corporeal existence. In other words, mind gets its whole and sole meaning from the living "battery"—the body—whence it emerges, by functioning as knowledge to keep it "in charge." And the object of the following pages is to indicate very briefly the nature of the "plugs"—the elements of knowledge—that close the circuit.

Many eminent biologists maintain that there is no external evidence of the presence of consciousness in the lowest forms of life (the protozoa and the lowest invertebrates). Though the issue has nothing whatever to do with the purport of these essays, yet, in view of the fact that in the phrase "cell consciousness" I assume its presence in some dim form, it may be well that I should state explicitly my credal views.

Before I do that, however, I should like to point out that conclusions as to whether consciousness is absent or present in an organism, based upon the complete

efficiency of neuro-muscular processes, are quite worthless. Functional sufficiency is a characteristic of all such processes with multitudes of which consciousness is indisputably associated. A negative inference on such grounds is therefore wholly unwarranted. In the cycle from the cut of the whip to the moving of the vehicle there is no break or deficiency in the physical series, but it would be preposterous on that account to conclude that the horse never felt the cut.

The only conclusion that such premises can ostensibly support is that consciousness is a superfluity in the animal economy.

Moreover, I wish to make it quite clear that I use the term "consciousness" not for a mere section of the mental field, but for the whole of it, both of feeling and of cognition, as well as for all possible degrees of intensity in the case of feelings, and of definition and certainty in the case of sense recognitions. As I use the word, it includes simple feelings and compound emotions, and all recognitions whether due to instinct or to individual experience—the characteristic that divides intelligent from instinctive behaviour. Thus the absence of intelligence by no means necessitates the absence of consciousness; nor does the fact that instinctive action is a function of nervous structure prove that a creature is as devoid of consciousness as a mechanical toy.

The basic article of my creed is that mere displacement or motion of matter can never give rise to consciousness, either as feeling or as sense impression. Hence I infer that the essence of mind is inherent in

ultimate substance, and that material organization is Nature's wizardly way of awakening it. This monistic view is neither new nor uncommon. Its most lucid and famous exponent is Professor Lloyd Morgan, to whom I have the honour of dedicating these Essays.

My next credal tenet is that consciousness made its first stirrings when its presence became a factor with survival value to an individual which possessed locomotion—as an urge to make search for its food, or as an aid to discrimination between the objects encountered, and finally as both. The evolution of mind is thus not the result of "matter in motion," but the outcome of a *necessity to move* on the part of a creature.

My next tenet is that no mathematical formula, however complex, based on the laws of mechanics, can possibly embody or summarize the ever-changing path of a "searcher"; and, except in the very simplest of cases, no form of chemotaxis will ever account for a creature's recognition of its prey or its foe.

The foundation stone of Materialistic or Monistic philosophy is not that organization may be without consciousness, but the indisputable fact that all psychic processes are as indissolubly united with neural ones (whether the converse is true or not) as are the concave and convex sides of a hollow sphere, together with the still more significant fact that the levels of organization and of mind vary together, in both the animal kingdom and in the life-history of every individual from birth to death, with the most absolute uniformity and accord. This dual truth is inherent in

sentient life. Will the Idealist vouchsafe to tell us what is the meaning of this duality—of this material concomitance, instead of trying to deprive it of significance by studied silence, evasion, or a camouflage of sonorous “learning” and self-complacent conceit?

J. C. T.

December, 1921

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CHAPTER I.

THE TANGLED PROBLEM.

SOME years ago a friend, in conversation, taunted me with the world-old question: "What is life?" And on receiving the equally ancient reply that I did not know, he asked, with emphasis, "Is it knowable?"

That depends, I said, on what knowledge means. To answer that we must *know* what is meant by "knowing." Further, as knowledge is a mental state or process, it was seen that it raised unavoidably the equally hoary question, "What is mind?" Moreover, as mind is obviously not a mere passive concomitant of life, but something that plays a rôle of paramount importance in the economy of a sentient organism, we came back to where we started—"What is life?" We also found that it did not matter at what question we began; we invariably came back to the starting point, as each query, of necessity, involved the others.

Now, ever since my early struggles in trying to delve in the arid and stony "soil" of the late Alexander Bain, mental science has exercised over me a weird fascination, and I could not rid my mind of this tantalizing three-in-one problem. So, off and on, I have been ever since trying to unravel this psychic skein, and the result of my reflections is embodied in the following pages.

It became at once obvious that, logically, the problem of knowledge had to be considered first. There was no meaning in trying to know what mind or life was until we had some idea of what was meant by "knowing"—a truth that was first effectively realized and taught by Locke, who, to his lasting credit, by virtually creating a science of mind and knowledge opened a way out of the obsessing fogs of metaphysics.

During my inquiry, and quite by accident, I came across an answer to the question, "What is knowledge?" in a primer on psychology by Dr. William McDougall. According to this learned metaphysician, knowledge is "a capacity or disposition to think and act in certain ways." But a moment's reflection was enough to show that this definition was no solution to the problem at all. It was very much like defining "water" as "a substance with a disposition to run down hill," or of "smoke" as "a something with a disposition to float sky-wards!" All very true, but how much wiser is any one?

It was not only superficial and non-informative as mere tautology; it was deceptive. You ask for bread, and you get a painted loaf. It is a solution only in appearance. And though it is a strange performance, it is quite in keeping with the writer's style and deliverances. From an apparent studied selection of non-committal terms and phrases and an astute silence about the plainest facts of experience, he appears to be ever endeavouring to impress the reader with the idea that in the "firm" called Mind and Body, "Body" is a sleeping partner with hardly a nominal interest in the concern.

And so, in this definition of knowledge, the term "disposition" stands for the *record* of individual and racial experience impressed or registered upon the substance of the nervous system of the animal body. To denote the fact by the term "disposition" is sufficiently evasive of information to be metaphysically safe. To call it "registration" or "record," with an allusion to the spatial, temporal, and physical nature of what is registered thereon, would be quite suicidal to a "pronounced metaphysician with a mission," for its Materialistic implications would be at once obvious.

If we omit all reference to its ultimate elements, physical and mental, as Dr. McDougall does, knowledge is obviously only a name for the *functioning of mind* in the interest of the individual and the race.

The next question in logical order was, Had the term "mind" any meaning without reference to its concrete basis; *i.e.*, when completely abstracted or divorced from its material setting—the body? If it had, what was it?

One of the most conspicuous effects of the incongruities with which self-consciousness has penalized man is the fateful habit of objectifying mere words or abstract terms, and then of treating the projected phantoms, though empty of all significant meaning, as realities! Was there any known reason for supposing that the abstract term "life" represented some entity independent of the physical process? None whatever. The term "life," if applied to an imaginary phantom, would lose thereby every shred of meaning it possesses—would become a mere verbal vacuity. There is just as much reason for crediting "death"

with an independent existence! They both alike get every item of meaning they have from their association with living substance—the one denoting the presence, the other the absence, of certain phenomena.

The more one reflects the more obvious it becomes that a sentient organism is a self-charging “battery”—the battery being the living body, while the “circuit” is consciousness or mind. This by functioning as knowledge keeps the battery charged—a state or process which imparts to the mind every particle of meaning it possesses.

Having found the meaning of knowledge, it was an easy matter to ascertain to what extent life was a known or knowable phenomenon.

The following chapters are obviously arranged not in the logical sequence of thought or of investigation, but in the natural cyclical order of sentient existence—Life, Mind, Knowledge; a physico-mental cycle that keeps sentiency in being, just as the spinning of a top, a gyroscope, or a world enables it to retain a constant disposition in space.

CHAPTER II.

THE CHARACTERISTICS OF LIFE.¹

PHYSICAL ENERGY.

As the phenomenon of life is intimately associated with the principle of energy, it would be well at the start to devote a few lines to recording its main characteristics.

Energy is a term which sums up the source of all phenomena. Probably its most unique trait is that if it be estimated in consistent units there is every reason for believing that its sum-total in the universe would be found invariable and always represented by the same number. In other words, the energy of the universe is a "physical constant." It always consists of two factors—*viz.*, a force (or a capacity to exert force) and a displacement. These may be called its physical and spatial parts respectively. Again, it may assume one of two forms, usually denoted as kinetic and static. In the kinetic form its "force" is wholly potential as momentum, which is merely a name for a capacity to exert force if the moving mass meets with resistance. And the spatial factor is the continuous displacement involved in motion. In the static form the force is inherent in the substance, as an impulse

¹ This chapter is inserted only for the sake of logical completeness. Those who have had no training in theoretical mechanics are advised to omit it; the omission will in no way affect the subject of the next chapter.

urging it to move in a straight line towards or away from some other portion or portions of matter, or to deflect it from a straight line if already moving in some other direction, the space element being the distance between the two masses, which are thus mutually made to approach or to part asunder.

It should be noted, in passing, that there is a radical difference between these two types of "force." That due to momentum is a capacity to make *other* bodies move, and that only when they intercept the path of its motion; whereas an impulse or urge tends to set in motion the mass in which the urge is inherent—that is, its *own mass*. For example, the weight of a stone moves its own mass only in the act of falling, but the falling body will tend to set in motion whatever happens to be in its way. A projectile hurled from the cannon tends to set in motion whatever lies in its path. In the same way, the missile itself is sent out of the bore by the aggregate bombardment due to the momenta of the liberated molecules; whereas the particles themselves were set in motion by the mutually repellent impulses inherent in the constituents of the charge.

But the most noted characteristic of energy is its tendency to alternation of form: from molar to molecular; from vibratory to radiant (*i.e.*, from matter to ether); and from static to kinetic, or in the reverse order, as the case may be. The activities of the universe consist in these alternations.

Now, energy is said to be "stored" or "accumulated" when the spatial factor increases either as speed or as displacement—*i.e.*, kinetically or statically. Like-

wise, it is said to be dissipated or spent when it passes from molar to molecular, or from matter to ether—*i.e.*, from a vibratory to a radiant form.

INDIVIDUALITY: ITS ESSENCE.

Anything that possesses or acquires, in consequence of some *delimitation of space*, a degree of individuality, and also some amount of permanence, is conceived by the mind as a "thing," as an entity. (Possibly these are the essentials of all entities.) Now, Nature exhibits two notable examples of such entities of energy, which may be aptly called "kinetic systems" and "static processes." These are entirely antithetical in character, but each has an amount of permanent individuality. In the first, the mass involved is always the same, and its energy is constant; but the mass is always in motion, which of necessity must be of the harmonic order. The solar system furnishes the most noted and obvious example of this type. Probably all molecules and atoms are similar systems.

In the "static process" every item is reversed. The substance of which the entity consists is ever changing, is in a state of flow, and is, therefore, never the same, while its energy, instead of being a constant, is always being stored or dissipated. Its only permanency is its form and relative position in space. A river, a water-fall, a well, or, better still, a flame or a fire, would be physical examples of this type of entity. But it is in living creatures that Nature exhibits this order in endless variety and perfection.

These static processes are necessarily associated with a storing or a release of energy; or, as it will be con-

venient to describe it, with "the rise or fall of potential." A cataract, a water-spout, or the whole river is *kept in being* by a fall of potential. Should that become impossible, the river would soon become a lake or a swamp. Inanimate Nature, however, does not furnish us with an impressive example of the opposite or up-lifting process—not that it does not exist, but because it is unseen. When water evaporates—that is, is converted into a gaseous substance, gets diffused through the air, and reaches the higher regions of the atmosphere, energy is put into it, or is at a higher potential. But, as steam is invisible, the process, though on a most gigantic scale, eludes our view. We are made aware of it only when it is reversed in cloud, rain, and river. And as water in the form of rain is a prime essential of all vital phenomena, it is obviously the most important process in Nature. It is hardly necessary to add that the energy used in this up-lifting is derived from the sun.

This double process is, as we shall see, a prototype of that which is ever in progress in the world of living phenomena. It essentially consists of an up-lifting and a down-letting—of a storing and a dissipation of energy. The vegetable kingdom is mainly devoted to its storing, the *leaf* being the factory which Nature evolved specially for the task. Its sole function is to convert the lifeless into living substance. The animal kingdom, on the other hand, corresponds to cloud, rain, and river, in which energy is released; for, though the living process in the animal body involves a higher lifting than is effected in the plant world, it is only for immediate dissipation.

The resemblance between the process of evaporation and condensation and that which takes place in living forms, though helpful, has only the analogy of an archetype—of a crude primitive pattern; but in a flame (or fire) we have a perfect analogue of at least half the process—the release and dissipation of energy. For they are both not merely chemical reactions, but the same identical chemical process—*viz.*, that of oxidation, and an oxidation of even the same substances.

In order to realize how complete is the correspondence between the two phenomena—that of life and of the flame—we must describe the physical process in some detail. And when it is seen what a multitude of contrivances, expedients, and devices (to wit, the entire animal body) Nature has elaborated solely to provide combustible material and available oxygen to burn it, it will be unnecessary, I trust, to enlarge upon the extent to which the living process is one of burning, and in which a redistribution of energy is a first essential, whatever it may involve besides.

CHAPTER III.

THE CHARACTERISTICS OF LIFE.

THE PHYSICAL FLAME.

NOW, first of all let us recall what a flame is; then we can see how completely it is paralleled by the process of life. We will note only its essential features. To begin with, it occupies a definite portion of space, which, though usually movable as a whole, is relatively fixed. A candle or lamp may be moved about, or from room to room, but the flame itself is fixed, relatively, to the wick or burner. Through this space a stream of matter continuously flows containing stored energy, which is liberated as it passes through the spot, having the phenomenon denoted by the term "flame" as its result. This, on account of its permanence, fixity, and more or less definite size and shape, acquires some amount of the distinctiveness and individuality possessed by discrete objects.

What concerns us now mainly, if not solely, in our study of animate Nature, is to know the conditions which must obtain to result in the release of energy as involved in the flame phenomenon. It is only then we can know the character and magnitude of the task which Nature had to perform in order to evolve an organism of the compound or animal type, or understand the meaning of her doings. The conditions that must be fulfilled for its occurrence are these:—

(1) The medium in which it occurs must be in accord with the nature of the phenomenon. In the case of a flame or fire it must be gaseous—the air.

(2) The substance which parts with its energy to produce the phenomenon must be in a state to do so with readiness—*i.e.*, its energy must be available, and its supply must, in reality, be *quite continuous*, however intermittently you may feed the fire.

(3) The element oxygen, separation from which endows the substance with its energy, must also be present in a readily available form.

And lastly :

(4) The condition of re-union (igniting temperature) must also be an actuality. When all these conditions exist a flame or fire is a necessary result.

But the cardinal or vital point which converts the process into a kind of entity is the fact that the liberated energy (as heat) of the portion which is actually undergoing change (*i.e.*, burning) is just sufficient to act as the necessary exciting cause to the incoming portion. This fact is the linkage which unites the “ changed ” with the “ unchanged ” into an indissoluble series, and gives the flame (or fire), though consisting of a continuously moving stream, its continuity and permanence. If there is a break in the flow of the “ feeding ” substance, or a “ miss ” in the exciting “ link,” the flame dies.

THE VITAL “ FLAME ” OR PROCESS.

Now let us see how this is paralleled in living substance. One point of difference must be noted forthwith, otherwise the points of agreement or identity

will be missed. The medium is water, and not air; is liquid, and not gaseous. This fact will make identical actions and processes to appear different things. Notwithstanding this difference of medium, both are alike a burning process. This is as literally true of living substance as it is of a flame or a fire.

Though the vehicle of life is water, yet, if the watery medium contains oxidisable matter (nutrient substance) and oxygen in solution, oxidation or burning will proceed just the same, the only difference being in the rate of combustion. Similarly, in both cases alike a stream of nutrient substance (matter with available energy) must pass through the space where the fall of potential occurs—the body; for, as we all know, “eating” is virtually the sole object of animal life, and is likewise the primary concern of all human thought and activity. In respect to this particular, a fire is the more apposite simile, for both body and fire are fed intermittently. Again, continuity is effected in both cases in exactly the same way, by “kindling” the new by the “old,” the unchanged by the actually changing. And, lastly, animal *body* gives the living process its relative fixity, discreteness, and individuality, much in the same way as the grate does to a fire, or the wick to a flame—all of which have to be renewed alike when worn out.

In respect to the redistribution of energy, there is a point of incompleteness: the vital process is double, whereas a flame or a fire is a single one, as it involves only a release or dissipation of energy. A living substance, as we observed earlier, is primarily a storing process, of which it mainly consists in the vegetal

world. But in the forms of sentient life both processes are equally represented, and on an immensely magnified scale, concomitant with which consciousness emerged into being.

This double fact is pithily expressed in the term "metabolism," which connotes at the same time the two opposite processes of continuous chemical changes—*viz.*, the *constructive* one, by which nutritive material is built up into complex and unstable living matter (anabolism), and the *destructive*, or counter process, by which protoplasm is broken down into simpler and more stable substances (katabolism).

SIMPLE OR MICROSCOPICAL FORMS.

These conditions are fulfilled in Nature in two ways, which in point of simplicity are as widely apart as the celestial poles. The phenomenon of life is manifested by two orders of living things—the simple and the compound. With respect to the former, the conditions are realized almost spontaneously; in the latter case, only by a method of the most elaborate and ingenious kind. So we must consider each case separately.

A member of the first or simple class consists of a speck or particle of living substance (protoplasm), to which the term "cell" is applied. Because they exist more or less in isolation, like a cottage in the country, they are called unicellular, or one-celled things; and as they are also looked upon as the first or primitive forms of life, they are, therefore, called protozoa, or first creatures. This class comprises all the legions of microscopic life which tenant our ponds, pools, and ditches, as well as the myriads of microbial forms

which infest the air. To provide these living specks—these tiny “flames” of life—with the necessary conditions of keeping themselves alight was no difficult task. Their watery home would naturally be impregnated with organic (*i.e.*, oxidisable) matter, and would also be saturated with oxygen, even when stagnant, and there would be no difficulty to get rid of the products of combustion. Microbial forms are parasitic, and depend upon their host for a supply of nutritive matter, which is one of the intrinsic, inalienable, and perennial sources of evil in Nature.

COMPOUND OR ANIMAL FORMS.

In the case of organisms of the compound or animal type we are in a different realm, or, rather, on a different plane of existence, and so extremely dissimilar in character are the analogues that, though exact equivalents in function, they cannot be recognized save by the well-informed and disciplined mind. What obvious identity is there between a muddy pool and the ruddy stream that flows in our veins?

In the compound organism the individual cells have combined for mutual aid, and have forgone or forfeited most of their individuality by so doing. The object or end for which they sought aid was the realization of the conditions essential to actuate the life-burning process and to maintain it. To have some conception of the magnitude and nature of the task to be realized in order to attain this end, let the reader suppose or imagine that the microscopic denizens of the pond conceived a common desire to move about and to change their position at will, instead of being

always tethered to the same spot. What would they have to do? In the first place, since water is "the vehicle of life"—the medium in which alone the process can take place—they would have to devise means to carry the pond with them! That would be the very first essential. Then they would have to keep it well stocked with nutrient matter—*i.e.*, matter containing available energy, and afterwards to provide it with free oxygen; next, to assure it an outlet for impurities—the products of combustion; and finally, would have to acquire a locomotive system for enabling them, as a community, to effect the movements desired.

Such, in brief outline, was the character of the task which had to be fulfilled, and is exactly the transcendent "miracle" which Nature, after infinite trials and failures, extending through an experimental period of millions of years, finally achieved. No one who takes the trouble to reflect over the thousand and one expedients and devices to which she resorted to attain this end can be blind to the fact that the redistribution of chemical energy is absolutely indispensable to the vital process. How did Nature solve the problem? The "pond" she hermetically sealed in a system of a million and one tubes, and though the community—the body—consists of countless myriads of cells which are all, more or less, attached and coherent, yet each is steeped in its watery medium. So the "city" can move about and carry its pond with it without spilling a drop of its life-supporting fluid.

So fundamental, so cardinal, is this blood-system to the life-process that the rest of the body is nothing but a group of organs and tissues, all engaged in the pre-

paration, purification, or distribution of this first essential, the *sine qua non* of life—the muscles, in securing and preparing the nutrient matter, and subsequently, when ready, in pumping it through the “city”; the alimentary tract, in making it soluble, and so available for “burning”; the respiratory system, in saturating it with oxygen and removing impurities from it; and the brain and its attendant nerves, in regulating and co-ordinating the other systems in order to ensure the provision of a continuous supply of a nutrient, oxygenated, uncontaminated fluid.

AN EXTRA LIFE AND NEW AWAKENINGS.

In the achievement of this transcendent result Nature reduplicated life and awoke higher up in the psychic scale. She made an advance vitally and mentally. She evolved a higher type of life and of consciousness. In the compound organism—*i.e.*, in any member of the animal kingdom, Nature has evolved a form of life immensely fuller and more comprehensive than that possessed by the individual cells of which the body consists. This is the corporate life of the body as a whole, distinct from and superimposed upon the life of the individual cells. So that the animal possesses at one and the same time two different orders of life—that of the individual cells and that of the aggregate (the body) in its corporate capacity. At the same time the vague glimmer of the *cell*-consciousness of the animalcule and microbe awoke, in the animal world, to a somnambulistic *sense*-consciousness. The amœba, though conscious, cannot see, nor hear, nor

smell, nor taste, nor feel in the sense that we do. This result Nature achieved by evolving tissues and organs specialized for single functions, on the principle of the division of labour; one to effect chemical change, another to execute mechanical movement, and a third to provide the neural system. The last was intended to awaken consciousness, indeed, several types of consciousness, that of sight, of hearing, of smell, etc., which the central organ co-ordinates in the interest of the corporate life. In man this organ is further developed, and Nature becomes fully awake in human *self-consciousness*. As his other structural modifications were correspondingly slight, man ultimately evolved into a lop-sided creature—an embodiment of incongruity.

WHERE THE FLAME-ANALOGY FAILS.

Though the analogy between the living process and that of a flame or fire is such as to be considered identical, yet the former possesses two essential characteristics, which are wholly unique, for the living cell, and especially the living body, possess an impulse which urges it to seek a supply of "fuel" to keep its fire alight, and also another impulse to provide a new "wick" or "burner" to perpetuate the "flame" when its own self is worn out. There is not the faintest glimmer of a promise of either of these impulses in the physical process, and to that extent life remains by the very meaning of knowledge "unknown" and a mystery. I do not wish, however, to leave the impression that the above two—the impulse to feed itself and that to propagate its kind—are the

only mysteries connected with living phenomena. Far from it. But the problems to which the others are attached are not essentially insoluble. When we do not know *how* a cause acts—when we cannot see and follow the successive links in the causal chain—a sense of mystery is created. Moreover, these problems, owing to insuperable sensuous limitations, may never be solved. It is very probable that man will never be able to extend the range of sight to enable him to study the infinitely small and the nature of ultimate substance, but the inability is not in the “ meaning of knowledge ” ; it is in the shortcomings of his sense-organs.

Till yesterday we did not know *how* things grew—how the germ became adult, or the acorn an oak. And we are far yet from knowing how or why a muscle contracts; how the food we eat is transmuted into living blood; or how the offspring throughout the entire living world is like its parents down to the minutest detail. None of these, however, are essentially unknowable. Could we only follow the processes and subsume them under familiar ones in chemistry or physics, they would at once become “ known.” But the mystery attached to an ultimate “ why ” will remain so until the human mind and its function (knowledge) are fundamentally and completely changed.

CHAPTER IV.

MIND: A HIEROGLYPH.

DECIPHERED FORWARDLY TO ITS PURPOSIVE ENDS.

As every term descriptive of mental states, processes, or products is in origin and nature a metaphor, however completely its material roots have, through selective usage and long custom, vanished from sight, I need offer no apology for comparing the elemental contents of consciousness to the characters, signs, and figures of a hieroglyph or a cuneiform script. Moreover, I claim for the term not only that it is apposite but that it is as literally correct a description as a metaphor or a simile can well be.

And I hardly think there is any need to offer here a disclaimer and solemnly assure the reader that no attempt is being made to "explain" consciousness: as it is an ultimate category, it is not susceptible of one. Even the indisputable fact that Nature evolved neural substance in an ascending series of complex organizations to act as medium for her progressive awakening, is *not* an explanation in the accepted meaning of the term. The object of this chapter is not to explain, but to deny and protest.

The modern Gnostic or Metaphysician, like his ancient prototype, oracularly assumes or declares that mind is a self-existent and self-deciphered something, wholly independent of body though somehow entangled with it and enthralled in consequence. He differs from his primitive ancestors only in the names

he gives to his "revelations." The ancient oracles resolved mind into a cluster of entities or personalities, whereas, according to the latest metaphysical declarations, mind is a system of "mental structures" which "always precede bodily structures"! And if it be further borne in mind, that it is the Gnostic, be his assumed title what it may, who always mints the coin of superstition and fixes the credal currency of his age, by which the minds of its youth are debauched and befogged, no apology need be offered for this protest against his wiles and sleepless activities.

THE MEANING OF MIND.

Now, if there be a fact, more outstanding in obviousness than another, it is this, that Nature's awakening into consciousness was as much a *device*—a means to an end—as the evolution of muscular tissue or secretive gland. Unless the animal mind be viewed under this instrumental aspect, it is as meaningless as an undeciphered hieroglyph or a cuneiform script; for it gets its *whole* and *sole* meaning in the structure and the aims of the body: its *immediate* meaning is found in the muscular system through which it serves the organism as a whole and enables it to realize its final ends. To those who build upon the evidence of the senses and the verdict of reason, mind, instead of being an independent entity with a self-contained meaning, is, on the contrary, only a cluster of heterogeneous elements which acquire any meaning at all, only by being merged as integral parts of the organism. Disconnect them from it, and they are as purposeless as a waterwheel detached from its mill.

It is the gearing of the mental elements with the material, in the mechanism of the body, which imparts to each of them all the meaning it possesses. Has hunger any meaning whatsoever apart from a digestive system and the necessity of eating; or animal fear, apart from the possibility of becoming a diet to appease the hunger of another? And what is true of hunger and fear is equally true of its entire elemental contents.

Mind, in psychic isolation, is a blank—a zero.

The ultimate elements of consciousness consist of sense-impressions and organic feelings. In themselves and undeciphered they are mere “blobs and daubs” of sensation and nothing more. The only characteristic they have in common is “consciousness”—being something “mental” as distinguished from “material.” Among themselves they are as heterogeneous as it is possible to imagine. They differ from each other in the most absolute manner, even when they represent or “translate” the very same form of energy as in the sensations of light and heat. What can be more unlike than the warmth of a fire and the sight of a snow capped mountain? and yet they are both psychic “translations” of the same radiant energy.

— But the Nature which devised the psychic glyph also provided a system in which it finds its meaning. Moreover, in the animal world, it has permanently registered that meaning in the nervous system of the organism, and *the registration of it is known as instinct.*

A living object has two ends or aims—one proximate and one ultimate—*viz.*, to prolong its own life and to perpetuate its species. These aims are common to both forms of life—plant and animal alike.

The animal, however, differs fundamentally from the plant in the fact that it has perpetually to move about in search of food—*i.e.*, of fuel to feed the fire that keeps life in its body.

This one characteristic difference has driven the two forms further and further apart until now they are as wide as the poles asunder.

This extra want—this necessity for incessant locomotion—called into being two correlated “structures”—the mental and the muscular, with their allied secretive organs, or briefly—“mind and muscle.”

These two characteristics, as every one knows, are both conspicuous in the vegetal world by their joint absence. Where there was no use for them, they were not evolved.

Now there is nothing more palpably obvious in sentient life than that mind and muscle are correlates, answering to each other as “lock and key.” The wards of a lock find their meaning in those of the key, and *vice versa*. A key without a lock is meaningless, and a lock without a key is useless. Such exactly is the reciprocal relation between the psychic and the muscular systems in the animal body. They have been evolved to act in unison as the wings of a bird.

This fact will be at once obvious if we bear in mind that the muscular system is a store of static energy which is ready at any moment to assume the kinetic form in bodily movements, and likewise that the various elemental factors of mind or consciousness act as psychic “valves” to deal out this energy as required to effect the movements that are necessary to

keep the fire of life burning as long as possible in its own body-grate, and to "kindle" another similar to it before its own dies out.

To act thus as a regulating valve, each psychic element must be at one and the same time an effect and a cause. For example, hunger as a feeling of want, as a sign that the fire of life is burning low, is an effect; but, as a stimulus to seek food to replenish it, it assumes the aspect of cause, though we are not oblivious of the fact that it is the concomitant neural process that discharges the impulse which compels the muscle to perform its movements.

Now a summary anatomy of mind on the principle of fundamental functions will resolve its entire contents into three groups of sensations or sense-impressions: (1) Those that goad; (2) Those that guide; (3) Those that guard or check, the necessary movements to achieve its two organic ends.

(1) The first group will include all organic sensations such as hunger and thirst; feelings like those due to heat, cold, illness, or any traumatic condition of the body, each characterized by a consciousness of *pain in some degree of intensity*, from a subliminal discomfort to a most excruciating agony. These, one and all, find their meaning in their capacity or power of stimulating the muscles to activity. Disconnect these feelings from the muscular system and they will be as meaningless as the signs and symbols of the Egyptian hieroglyphics before the Rosetta stone was discovered—a truth that is absolutely confirmed by the fact that they drop, one by one, out of consciousness as their allied organs cease to function through age or disease.

(2) The second group will include touch, sight, and sound; the senses of *recognition* and *location* of objects in space. These, likewise, find their sole meaning in directing and controlling bodily movements in pursuit of the same ends.

(3) The third group consists of the senses of taste and smell, the sentinel senses guarding the entrance to the alimentary tract; and they, likewise, find meaning in the fact that the quality of *agreeable* and *disagreeable*, with which they are characterized, has the power of maintaining, quickening, or inhibiting the muscular activities involved in eating, drinking, or swallowing.

All this is true not only of that section of mind which is concerned with the prolongation of life; it is equally true of that related to the perpetuation of the species. Sex love finds its whole meaning in the genital systems, and mother-love is similarly deciphered in the maternal activities and the mammary glands, the sole end of which is the protection and nutrition of offspring.

Thus, the whole of mind, as manifested in the animal world, instead of being a something which contains its own solution, as the Gnostic oracles declare, finds the only meaning it has in the muscular and glandular activities of the body.

It will be observed that in the foregoing I have constantly used the term "mind" and not nerve, though the physical linkage denoted by instinct is between muscle and nerve. I have done so deliberately, to emphasize my conviction that mind is not a superfluity in the animal economy as some would have us believe,

something which the creature could dispense with and still live its life unaltered.

I know that such a contention can be plausibly argued, but it would be out of place to discuss the matter at this point, and offer my reason for rejecting it. It will be fully considered in the last chapter.

I see no reason for objecting to the term "epi-phenomenon" as descriptive of mind, provided it is not made to connote something wholly superfluous.

All that we have said in respect of the animal mind is equally true of man's. There are only two points of difference. Firstly, that in the vast majority of cases their meaning is learnt by the *individual's own experience* instead of being registered on the nervous system as inborn instincts. And secondly, that the animal is not aware of the meaning. It acts on it, but is not conscious of its purposive significance.

The creature eats, drinks, fights, flees, hides, and procreates, but it is wholly oblivious of "why" it does any of them.

Its organic sensations acquire meaning in the fact that they act as impulses, and its sense-impressions in the fact that they act as guides to its movements; but the whole drama is a sort of somnambulistic show enacted in a state of semi-wakefulness.

How man has super-imposed upon Nature's instinctive decipherment of feeling and sense a genetic explanation—*i.e.*, how human reason has traced each sense-impression *backwards* to its physical origin, as instinct deciphers it *forwardly* in purposive action, will be considered in the next chapter.

CHAPTER V.

MIND: A HIEROGLYPH.

DECIPHERED BACKWARDLY TO CAUSAL SOURCES.

HAVING now considered how Nature herself deciphers her psychic hieroglyph *prospectively*, from cause to effect, as impulses, guides, or checks to movements with purposive ends, we will next exemplify how man has superimposed upon this decipherment an explanation, *i.e.*, a *retrospective* interpretation which traces the effect backwards to its physical source.

But first let us see how he came to do it.

As the cell consciousness of the protozoa awoke to the sense consciousness in the corporate life of the compound animal organism, so the sense-conscious animal awoke, in the extra development of the human brain, into self-conscious man.

These psychic unfoldings, the *cell-conscious*, the *sense-conscious*, and the *self-conscious*, are the three successive awakenings of sentient life, life itself being the first of the series.

Now in virtue of this last awakening man is a being who is *conscious* that he is conscious, who *knows* that he knows. And in this new light he became aware of causal relation, *qua* relation, and it enabled him to abstract the relation from the related terms as an idea or mental entity. And thus began the building of that "construct," that "ideal universe" of man,

whose "substance is human thought," not in metaphor, but in reality.

This mental universe the idealist blows off as a boy does his soap-bubbles. And then with his characteristic contempt for all decipherment based upon the data of experience, the metaphysician declares oracularly that "boy, pipe, and soap-suds" are inside the bubble, and presto, the material universe vanishes from existence!

Having thus conceived the idea of causal relation in the forward order of "from cause to effect," in the meaning of his own impulses and the gratification of his own desires, he conceived the new passion of inquisitive curiosity for similarly knowing causal relations in the reverse directions. *i.e.*, from sense-impressions—objects and events—to their physical origins. That is to say, he conceived an irresistible desire to super-impose upon the organic meanings of his sensations and sense-impressions, a genetic interpretation, an *explanation* of things. It is the most characteristic result of being self-conscious.

It has been, however, a racial calamity of the most colossal magnitude that man ever developed this capacity and desire for "explanations" so many æons before he was in possession of any sort of key for the task of decipherment, that is, before he had resolved his own sensations and sense-impressions to their causal factors: or before he had the faintest glimmer as to the nature of physical substance and energy.

This tragic anachronism enfolded the earth with the fogs of religious superstitions and the mists of meta-

physics, with the result that man has been ever groping for a path for his feet. It was a case of "making bricks without straw"; and sad to relate the art is practised by the metaphysical Gnostic even at the present day.

We will now exemplify this genetic explanation which man has superimposed upon organic meanings by a more or less detailed reference to one sense, the sense of sight. And what will be said of sight will be true, *mutatis mutandis*, of all the rest.

THE SENSE OF SIGHT.

Sight is the premier sense evolved by Nature for the purpose of *recognition and location* of objects in space. It is pre-eminently a spatial or a tele-sense.

The eye was not evolved merely to awaken a sensation, like hunger or thirst, but as a psychic instrument or device—a past marvel of ingenious complexity for enabling the organism to recognize and locate physical objects at a distance—especially those which vitally concerned its own life; and science teaches us how this miracle of recognition and location is effected. It will be seen as we proceed that in fact it is a double sense—that of light and of colour—and that one of them is doubly symbolic. Thus in the light of self-consciousness man discovers not only the meaning and purpose of sight, but, with the aid of the illuminating lamp of science, he also discovers its causal antecedents and its genetic history. Let us, therefore, see how Nature made it a sense of recognition and location.

The first thing taught us by science is that there

is such a thing as radiant energy of various forms eternally undulating through the interstellar ether of space.

The second fact is that Nature evolved a nervous tissue at the back of the eye-ball, called retina, containing a pigmental substance capable of absorbing a certain order of this radiant energy, and thereby of exciting the optic nerve.

Thirdly, that this energy, when transmitted to the optic centre of the brain, is "translated" into the sensation of sight or vision to form an elemental character in the hieroglyphic of consciousness.

But these provisions would only enable the mind to become aware of light as distinguished from darkness. As an instrument to see terrestrial objects it would be quite worthless, let alone to recognize and locate them.

So Nature evolved the eye, a camera obscura for the formation of optical images. Now an optical image is usually formed by the radiation reflected and re-emitted by the object, and though the image is only a projection of a solid on a flat surface, and is, moreover, immensely reduced in size, nevertheless it bears a resemblance in shape and relative size to the object, which experience, in time, learns to decipher as factors in recognition and location.

Yet, as an instrument for full recognition, the sense would be still most inadequate.

When radiant energy meets a material object it is liable to a triple partition. If the object be more or less transparent, a portion of the radiant beam passes right through it: this will not affect the image. Another portion will be reflected from the surface

depending upon its degree of smoothness and upon the slant of the rays which fall upon it. A third portion will penetrate its substance and will be partly or wholly absorbed. But what is not absorbed will be re-emitted and this will join with the reflected portion and greatly affect the image, for it consists of only fragments, which always vary, of the entire beam.

Now Nature's triumphant skill in the evolution of sense-organs is seen in the way it utilized this fragmentary nature of re-emitted radiation as a means for recognition. *It evolved a sense of colour in addition to the sense of light*, the colour or shade being the psychic equivalent of the portion that is *not* absorbed and therefore re-emitted by the object. And as this portion is generally different for different classes of objects and fairly constant for individuals of the same class, it becomes the distinctive mark or clue in the act or process of recognition and detection.

The eye was now a recognizing or detecting sense sufficiently accurate for the ordinary purposes of animal life.

In the camouflage of mimicry, however, Nature has gone far to undo or nulify her own handiwork, by making it often nigh impossible for a creature to detect the very objects it is to its highest interests to see.

It will now be seen that sight is, in more than metaphor, a photographic sense for taking "instantaneous coloured pictures" of distant objects.

It is a doubly symbolic sense: for the final picture is only a psychic symbol of the retinal image, while the retinal image itself is only a microscopic symbol

of the physical object. This fact makes decipherment difficult and tedious and liable to errors and illusion.

Similarly, to make hearing a recognizing and locating sense, Nature has evolved or adopted such ingenious devices in "tuning" that not only do we never confound the cries, songs, or twitterings of different species, but often recognize the bark of a particular dog. So discriminating is it that we recognize different individuals by their voices, and the county of one's birth by his local accent.

In this way man has satisfied his inquisitive passion for tracing things back to their causal origins by adding a genetic explanation to an organic meaning. A sense-organ is, therefore, now known, both "fore and aft," forward to its purpose and backward to its physical source.

He has, moreover, traced the phenomena themselves to their genetic forces; and then, as a coping triumph to his achievements, he utilizes this gained knowledge in a purposive manner (as Nature does with the elemental contents of consciousness) to produce these phenomena and sensations at will: he cultivates the soil and makes the earth increase her bounties and then proceeds to prepare his feasts; he has invented tens of thousands of industrial and decorative arts wherewith to satisfy his needs or gratify his desires.

THE MYSTIFICATION OF FACTS BY PHILOSOPHY.

Before leaving the subject I wish to draw attention to the strange use made of these revelations of science in respect to the causal dependence of our elemental sensations upon physical energy, even by so sane an

author as the Hon. Bertrand Russell, who in his delightfully lucid manual entitled *The Problems of Philosophy*, bases his whole disquisition upon the possible inference that the table in his room does not exist at all, because it varies in shape, in size, in shade or colour as you look at it from different positions and distances, or in different lights.

In this admission he either completely ignores the revelations of science in respect to the meaning, genesis, and *modus operandi* of the senses, or he deliberately flings the canons of inductive logic to the winds.

These variations, instead of casting doubt upon the real existence of the table, only bear evidence that the law of physical causation is absolutely immutable in all its operations, that effect follows cause with a uniformity that knows no variation or shadow of turning.

This chapter, I trust, conclusively shows that the radiation forming the optical image has only a *tangential* relation to the table it portrays. It is not the table that forms the image, either the physical or the psychic, but the radiant energy that happens to impinge upon it. All that the table does is to deflect the beam from its course and bid it to convey a message to any eye that it may chance to meet.

The amount of radiation that reaches the eye is, as we saw, most variable in kind and in quantity, and so, of necessity, should the picture resulting from it be likewise variable.

Were we living in a primitive age, when nothing was known of physical substance and energy, such an

inference would be rational, as it was rational to conclude, prior to the teachings of chemical science, that when a body was burnt it was annihilated; but it would be bordering upon insanity to draw such an inference nowadays from its disappearance; so it is to doubt the existence of the table because the mental picture which the rays of light make of it varies as we change our position. If it did not vary it would be quite logical to deny the uniformity of Nature and the law of causation.

Had Mr. B. Russell consulted the sense nearest to physical substance—the *sense of effort*—and not the one most remote from it, he would have been left in no doubt as to the permanent existence of the table, even if he burnt it, provided he used the sense of sight as a recording instrument.

Mr. Russell, consequently, devotes considerable space to enquire into the meaning of certain words and phrases such as “mental,” “in the mind,” etc. This is perfectly in accord with all precedent and custom. The metaphysician’s raw material consists not of “things,” but of “words.” He, therefore, never troubles to enquire whether he is building on a metaphysical cloud-bank or on the bed-rock of fact. He is wholly engrossed in his all-absorbing task of “word-splitting” and “phrase-chopping.”

Is it, then, any wonder that philosophers are ever engaged in pricking each other’s bubbles or in blowing new ones? Still less surprising is it that their arduous and life-long labours are as notoriously barren of result as the Desert of Sahara is of vegetation.

Berkeley realized the fact that the contents of con-

sciousness were mere symbols or signs; but he utterly failed to notice the equally palpable fact that their *meaning* was to be found in the proximate and ultimate ends of the organism, and were deciphered for him by Nature herself in animal instinct. And he equally failed to appreciate or realize the significance of the *explanation* given by science of its elemental contents by showing that each of them is a psychic equivalent or "translation" of some form of physical energy first transmuted into nervous energy by the sense-organ specially evolved to do it. Consequently, in his eagerness to find some plausible "philosophic" support for his Christian Creed, he conceived the preposterous notion of identifying object with subject—body with mind—as equally mental in essence.

Had he attempted to find, on such an assumption, a meaning for the evolution of the physical body and a reason for the necessity of its composite and complex organization; or show *how* and *why mind-stuff* should so disguise itself to the *mind* (and in so deceptive a manner as that assumed by a solid or liquid—a stone or water); in brief, had he realized that it was, at least, as impossible to conceive how the mental materializes as it was to see how the material became mental, he might have saved himself from making public his "famous insanities."

He stands much in the same relation to the modern Gnostic as Plato did to his ancient forerunner.

If ever the human mind gets out of the "woods," these notorious pioneers of obscurantism will one day be duly de-canonized and relegated to the museum of "mental disharmonies."

CHAPTER VI.

KNOWLEDGE: THE FUNCTIONING MIND.

THE RELATIVITY OF COGNITION.

THE above title is now an ancient phrase, and on account of its many metaphysical associations it may be in attractive, if not actually repellent, to many readers.

If so, may I at once ask them to disabuse their minds of any false notion and prejudice, as nothing of the nature of metaphysics will be found in the following pages? There will be no display of word-splitting or phrase-chopping, alternately pricking and blowing transcendental soap-bubbles, or "looping the loop" in the dreamy heights of metaphysical cloud-land. On the contrary, there will be nothing but statements of plain facts or of obvious deductions from them—facts of universal experience, so that the reader can at once check the truth or falsity of the statements. So may I repeat that the object of this essay is not to expatiate upon "the impossibility of conceiving the absolute," or upon "the impossibility of the relativity of cognition"—the so-called "doctrine of phenomenalism"—but solely to stress the fact that the entire contents of human knowledge consist of elements or factors which are wholly related to a mundane and corporeal existence, and which have no meaning whatsoever save to a creature which is a material focus, existing in space and time, through

which passes a constant stream of physical energy kindling the assemblage called body into life and consciousness as it passes through it.

These fundamental elements are obviously the four relations of: Similarity (and its opposite), Space, Time, and Energy. They may be termed, respectively, the psycho-physical, the spatial, the temporal, and the causal factors of knowledge, which in all its comprehensiveness and diversity has no other constituent element or factor. They are the entire warp and woof of cognition.

By way of parenthesis, I may point out that it is sufficiently obvious that these are the sole ultimate strands of knowledge, from the meanings of the universal interrogative particles of human speech. These clearly indicate the domain of knowledge from the nature of the information asked for. They are of four kinds: "What," "Where," "When," and "How or Why." And as they sum up the totality of the notions, in respect of which man is by nature "restively" ignorant, so they reveal, of necessity, the entire area or field covered by his knowledge.

The first asks for the group or *class* to which something "unknown" belongs or is like, and when the information is given it becomes "known." The second asks for its position in *space*; the third wants to know the order of an event in *time*; and the last enquires after *causal antecedents*. And when all four are answered, man's knowledge of that particular object or event is complete and final until he begins to ask them over again in respect to some of the answers.

Again, however completely any one of these relations be abstracted from the related terms, and however much they may be compounded or permuted with each other, as in mathematics, or sublimed away as in metaphysics, the remnant or resultant possesses no significant meaning unless its roots are still embedded in the soil of these four relations of corporeal existence. If it be completely dissociated from that soil, its expression, be it ever so sonorous, "learned," and grandiloquent, will be mere "sounding brass and tinkling cymbal." And perhaps I ought to add, that it makes no difference, whether the knowledge is innate and instinctive, acquired through experience, or deduced by reason; its elemental factors are ever the same.

Before we proceed, however, to exemplify how these four factors enter into and permeate every conceivable form of "the known," it would be well to point out the three different ways or meanings in which the term "to know" is used in ordinary writing and conversation, as I may have occasion in the course of this essay to use it in all of its three senses.

1. In the first place it often stands for the first of the four factors, that is, for the act of re-cognition, as when we say "I knew him at once," "Do you know your coat?" "The ox knoweth its master's crib," "The sheep knows its own lambs." Or again, when the mother exclaims, on seeing the infant's face lit up with the smile of recognition, "The child knows me." In all these instances of knowing it is the cognition of identity. It is a knowledge of the "familiar," because it awakens recognition.

2. More frequently, however, it is used in a very

different sense and, apparently, one with no connection with the former. It is used in the sense of a mental "record" or "register" of sense impressions and other forms of experience.

In this sense it has a very wide and varied application. For example, we say: "I know my lesson; I know French, Euclid, geography, history, etc.; or again, of the town or country where you were born or where you have lived, you say, you know it. In the same sense will an engineer or mechanic be said to "know" his machine or engine; a farmer to "know" his farm and his stock, or a merchant the contents of his stores, etc. In every case it means that a multitude of diverse facts are registered in the mind; that the mind is more or less a complete record of them, just as a gramophone disc is a record of a song or a speech.

3. Often, however, it is used in much the same sense but with a fuller meaning. It is made to include, besides the mental or neural record of experience or instinct, the additional fact that this record is linked up and co-ordinated with the muscular system. In this sense knowledge may be defined as "a disposition to act and think in a certain way." That is its meaning when we say: He knows how to swim, how to play the piano, or how to drive a motor. In the same way we say that a bird knows how to build its nest, a beaver its dam, or a spider its web. In this sense it explicitly embodies the truth I stressed in a previous essay, *viz.*, that mind finds its sole meaning in the muscular system.

These three meanings, though apparently distinct and different, are not independent. They are simply

three stages or phases in the " life-history " of knowledge, somewhat analogous to the stages or phases in that of a corn field—the sown field, the growing corn, and the matured crops ready for the mower. So in the mind there must first be a " record " of experience, racial or individual, before a *re*-cognition is possible; while movement is the " fruit stage "—the end and goal of both recognition and record.

The record is potential and dormant; in recognition it quickens into actuality, and in movement the two realize their destined object in the preservation of the life of the organism.

Possibly another word of warning may not be wholly out of place, to wit, that the fusion between these primary elements of thought is much more intimate than is conveyed by the metaphor " woven fabric." The fusion of different metals in an alloy or of different minerals in a crystalline rock would be a much more apposite simile. The human mind, however, can isolate them in thought, so we will take them one by one and see how they unite and fuse and form that psychic conglomerate called " mind."

CHAPTER VII.

KNOWLEDGE: THE FUNCTIONING MIND.

RE-COGNITION.

As already intimated, the cardinal strand of relativity in the fabric of knowledge is the mental act of recognizing the like amid the unlike—of becoming conscious or aware that a present sense-impression or sensation is like the revived or re-suscitated image of past ones. This is the basic fact of consciousness, which enables mind, as intellect, to be instrumental as means of preserving the life of the organism. Pain or discomfort is the corresponding primary element in the domain of feeling or emotion. It was this capacity of becoming aware of discomfort and of likeness that made the emergence of animal life a possibility.

In the sub-human or animal world this capacity is now innate or instinctive; in man, however, it is virtually all acquired through one's own experience. Mind, as intellect, is practically non-existent in the human infant. The only bit of external world—the special domain of intellect—that exists for the new-born babe is the mother's breast, which it recognizes by means of its tactual sensations—a recognition which acquires meaning by being instinctively linked up with the muscular mechanism involved in the process of

sucking. And even this fragment atrophies as soon as the material need of it vanishes. But as its external world of instinct disappears another emerges into being. Through the incessant repetition of the same or similar sense-impression a miniature world of *recognized* objects comes into existence. At first it is mainly, if not solely, a recognition of individuals—the mother being the first to become a recognized object. Then, by dint of ever-increasing familiarity, other members of the family become “known” objects. Then, as this faculty of recognition grows in discriminating power, the recognized individual is succeeded by the recognized “class.” For the child now recognizes objects not as individuals but as members of a class—as “gee-gees,” as “bow-wows,” as “moos” or “dickies.” This is quite a revolutionary extension in the application of the power. It is almost a new departure, for now it has become a relation of likeness, not between a present sense-impression and the image of past ones, but between the external objects themselves—the mind acting only as a gauge of reference.

The classifications made by sight are soon confirmed by one of the other senses. The child soon learns to recognize a sheep by its bleat, a cow by its low, a dog by its bark, and a horse by the tramp of its hoofs.

THE PURVIEW OF REASON.

Let us now cross the line which separates the animal mind from the human. The recognitions hitherto considered are as often due to instinct as to reason. For in the animal world recognition is the psychic thread

by which every creature picks out its path of safety along the perilous maze of life. But we now come to consider modes of grouping which are uniquely human.

Man's distinguishing characteristic is reason—a word which merely epitomizes the fact that in him *animal consciousness has become self-conscious*, and that he has thus become aware not only of sensations and sense-impressions as such, but of the relations existing between them. In virtue of this awakening, the human mind can take survey of its own field and study its contents in their relations to one another. These interrelations will form our subject of study as we proceed. We are now, however, concerned only with the fact that man can isolate or abstract in thought any one sensation, and include under it all things which affect him in that particular way, however much they may differ in other respects. So objects may be classified as black, white, red, heavy, hot, nutritious, poisonous, transparent, hard, soft, etc.

Such abstractions are usually described as qualities, attributes, or properties, as if they were something resident or inherent in the object. For example, sweetness is generally considered as a quality immanent in sugar or honey. We now know, however, that the sweetness is in us and not in the substance, and the same is true of every other subjective effect. What the object possesses is a capacity to affect one of our sense-organs in such a way as to give rise to the particular sensation through its parting with, releasing, or absorbing energy according to the nature and purpose of its function. In much the same way we isolate and

abstract in thought the beneficial or injurious effects of our actions or conduct upon others, and classify accordingly. Hence, we have a class of just acts, legal acts, kind acts, wrong acts, etc., covering between them the whole field of morals, customs, and convention. Justice, cruelty, or kindness indicates a uniformity in behaviour in exactly the same way as sweetness or bitterness does in substance.

Even in speech, recognition plays a cardinal part; no meaning is ever awakened in the mind by any word, phrase, or sentence until its sound or symbol is first recognized. Again, in our daily routine of activity and toil every movement and action is based upon the recognition of something—quality, a class, or an individual.

Even poetry owes its charm and power of gratifying the mind to the pleasurable thrill of recognition. By the free use of the figures of speech it enables the reader to cognize a likeness, resemblance, or analogy between things or events widely different and unlike. The mind, under the suggestive spell of simile and metaphor, discovers, where it little expects it, some well-known quality or trait, and that often as suddenly as a familiar landscape scene is revealed by a lightning flash.

Again, this relation of likeness is observed in abstract numbers in a singularly perfect form. It is not a mere similarity, but an equality or identity. For example, a number of objects or units, say ten, is identical quite irrespective of what the objects in themselves may be; and the difference between that number and any other number is absolute. This cognition of

equality or difference is the basis of all mathematics. From first to last it is to find out some unknown number on the assumption of equality.

The meaning of a "unit," another conception equally fundamental and essential to the science of mathematics, save to that of geometry, will be considered when we come to discuss the relations of space.

Man's greatest triumph, however, in the exercise of this faculty of mind was achieved in the detection of similarities which were hidden from every sense we possess, but which, as the result of observation, experiment, and logical inference, were discovered by the mind's eye. For example, what similarity could be observed between sugar and soot, or between the sea and the air, or between a star and the earth, or between a candle burning and a nail rusting? And yet in all these cases, and in tens of thousands more, man has proved the existence of similarities or identities which enabled him to assign them to the same class or classes of similar things.

Now, as the result of exercising this mental faculty for some thousands of years upon the multitudinous diversity of phenomena of which the world around us consists, every object and force within it, from the rocks beneath our feet to the stars above us; from the giant forces which churn and lash the seas into fury; which make the earth tremble, or which hurl from its volcanic bowels streams of liquid fire, to the gentle and silent forces which make the grass grow or the human brain to think—all this vast mass of heterogeneity and diversity has been enrolled and grouped into classes and sub-classes called sciences; and,

whether they are co-ordinate or subordinate, each class is held together only by the psychic cord of similarity. And just to the extent that man has succeeded in thus grouping physical and vital phenomena has he a sense of "knowing" them. The *unclassified*, the strange, and the odd is an "unknown," and as such it disturbs our equanimity and contentment; but the moment we discover a likeness in it to something familiar, a feeling of a mysterious satisfaction comes over the mind.

Thus the basic element of knowing a thing is the fact that it is *like* something with which we are already more or less familiar. Or in the case of groups of apparently different and distinct objects with each of which we are more or less acquainted, our knowledge is extended when, on account of some discovered likeness, we include the less in the more familiar, as when the stars became suns, and planets, earths ; or when the rotundity of suns and planets could be assigned to the same cause as that which rounds the dew-drop. Not that we are one iota nearer to comprehending or understanding the ultimate nature of the "something" which is the sun or planet, or of that other "something" which rounded them both into spheres.

CHAPTER VIII.

KNOWLEDGE: THE FUNCTIONING MIND.

SPACE.

WE will first consider how sensuous space—the space of the senses—as distinct from that of the reason, becomes a constituent of knowledge.

It is very questionable whether knowledge ever consists wholly of the one element—re-cognition—which we have just been considering. From the start re-cognition is allied with spatial factors, with which it coalesces or fuses into a homogeneous whole. The child's recognized objects are usually not in contact with it, or with each other; a gap intervenes. This interval is probably the first sensuous indication of space. These gaps vary in length, and the child slowly learns the fact through its muscular system. Now, a recognized object becomes "known" only when its position, relative to some fixed spot or place, is registered in the mind in such a manner as to be easily revived as a whole, including the recognized object as well as the object of reference. Thus a knowledge of space is essentially a relativity—a relation of distance between the position of an object and that of some other object.

HOW THE IDEA OF SPACE IS ACQUIRED.

The child's knowledge of space begins with the home. It first learns the spatial relations between the objects which form the contents of its rooms and those between the rooms themselves. As it begins to make excursions into the region outside, the house itself acts as the spot of reference. The hedge, the garden, the brook, the road, the field, the trees, all become objects of knowledge when their respective positions in reference to the house are duly registered in its mind. Moreover, that it is a thing of three dimensions is fully impressed from the first. The position of a particular tree must involve the sub-element of direction, that is to say, whether it is to the right or to the left of the door, or straight in front of it, or on top of the hedge. And when the child extends its acquaintance from the immediate environment of its home to embrace the country around, with its roads, rivers, hills, villages, and towns, every object within it becomes knowledge when its distance from some place of reference is so registered in the mind that both positions are revived simultaneously and separated by the "intervals" as when actually seen.

It might be well at the start to mention that I am not oblivious of the fact that in the animal world spatial positions and directions are, in some mysterious way, perfectly known to instinct without any individual experience at all. Migratory birds find their way to distant climes—abodes which they have never seen—and insects find untaught the proper, though

most obscure, places in which to lay their eggs or find their food.

The best way to understand the meaning of space as known to reason is to ascertain what it means to the various senses concerned. Rational space is obviously the outcome of the sensuous.

Firstly, and fundamentally, space is that in which *movement* is possible; it is that in which you can move your arms or walk about, and so change the position of your body or its limbs. That, primarily, is space. It is essentially a relativity; for movement means displacement from one position to another—a withdrawal from the first and an approach to the second. Absolute motion is a contradiction in terms.

Secondly, it is that which separates visible objects from one another and from the eye; it is the visual *interval* between objects.

Thirdly, it is that which is *occupied* by objects or “cubic extension.”

The first meaning is implied in the muscular system. A muscle is an organ intended specially to effect motion, which would be a contradiction in fact if there be no room in which to execute it. As we have just said, movement implies space, and muscle implies movement. The second meaning is likewise implied in the retinal surface, on which images of objects appear separate and discrete points. The third is, in a similar way, implied in the sense of touch, which simply means that space at the touched point is occupied. Hence, that which is occupied by objects, that which forms intervals between them, and that in

which they may move, is space as attested by the sense of touch, of sight, and of movement respectively.

Another sense, that of hearing, contributes its quota to making the impression of sight more exact and knowable. In the case of sight, a landscape, with all its varying distances from the eye, is projected on a flat surface, and gives directly no indication of depth. This distance the mind learns to infer from minute differences between the images of the two eyes. In this task the muscles are aided by the ear, since a familiar sound varies in loudness with the distance of its source from the organ. Indeed, taste and smell involve spatial elements, but not in so palpable a manner as they are in the others. Thus space is associated with the cognitions of every sense.

HOW SPACE ENTERS INTO CONCRETE LIFE AND ABSTRACT SCIENCE.

Is it a matter of wonder, then, to find space elements invariably forming an integral part of every type of knowledge met with in the discharge of duties in all spheres and pursuits of social life? Just reflect: every article, every commodity, every object is situated, placed, or lodged somewhere (a shelf, a drawer, or some resting place), the relation of which to some other position in space (the house, the room, etc.), must be known to enable one to discharge his daily routine of duties.

The business knowledge of a shop or store keeper essentially means a mental registration of the relative positions of the places where the articles in stock are

kept. And the same is more or less true of every avocation in life.

In learning geography from the study of maps we are generally concerned with that which lies outside our experience, and so we get a fictitious knowledge of space; but it is only an artificial extension of that of sight—the visual interval. On the map, objects are represented by words and positions, by dots and lines, whose relative dispositions on the paper correspond more or less faithfully to those of the actual objects; and thus the mind gets an image of the world indirectly through the miniature picture of the cartographer.

In astronomy we are again dealing with realities; but the objects are so far removed that tactual space can be conceived only by an effort of the imaginative reason. In the stars, with their intervals, we have a fine display of visual space; and in the motion of the planets we likewise get knowledge of the muscular sense of motion exemplified on a scale of colossal grandeur.

But in no department of thought does space play a more paramount or essential role than in the science of mathematics. In geometry we have space cut up into *ideal* shapes and figures, such as circles, triangles, parallelograms, squares, etc. These are all imaginary abstractions, or ideals, for the purpose of comparing the magnitudes of the lines and areas of the different figures. No one but an Einstein ever dreamt of treating them as actualities. Every demonstration begins with "Let AB be a straight line," or some such; and it matters nothing to the proof whether it is or not,

as long as it is supposed to be one. Again, in the science of numbers, arithmetic, algebra, trigonometry, etc., it plays a more essential role still, for it is their very foundation. The *unit*—a delimited portion of space—is “the cornerstone of the building.”

Of all the devices which civilized man has conceived and embodied, not one has excelled in point of ingenuity the conception of the use of the unit. Even the device of the alphabet must take a “lower seat” in comparison. It has virtually endowed man with supernatural powers in the discovery of forces, in the establishment of theories, and in the construction of the million million things which contribute to make up the civilized world. This miracle is performed by enabling man to compare magnitudes which are far apart, and which often would be forever impossible to bring together and place side by side for comparison. With the device of the unit the relative magnitudes are easily ascertained and compared. But the unit, even when its object is to measure time or force, is *spatial* in character or in application. The unit of time is so much displacement on the face of a time-piece and before you can use your unit of weight you must have a pair of scales to make it spatially visible. Thus, in all cases, every number, quantity, or magnitude is spatial at bottom and is thus, in the most emphatic sense of the word, a “relativity”; for every numerical quantity is relative to the size of the unit adopted to measure it.

This is now called by the Einsteins “measured space,” and is declared to be the only real space, as if it came into “being” in the act of measuring it!

These "latter-day" Gnostics talk about "the relativity of motion," apparently oblivious of the fact that relativity is an essential part of its meaning, and so choose to confound the relativity of consciousness with that of knowledge. Life became conscious with the cognition of *difference*; consciousness became an ally to life with the cognition of *likeness*. The important bearing of the foregoing and subsequent discussions upon the Einstein stunt is obvious.

CHAPTER IX.

KNOWLEDGE: THE FUNCTIONING MIND.

TIME.

As the continuity of matter involves space, so does its permanence imply time. But it may, I think, be safely said that neither of them would ever become constituents of knowledge from these attributes. It was the granular state—the segregation—of matter and its further integration into objects that discloses the existence of space. Similarly, it is the interruption and change of sensation which breaks up experience into more or less rounded events that reveal time.

It is the sense of difference that awakens consciousness to the cognition of existence, as it is the sense of likeness amid this difference that engenders that intellectual satisfaction called knowledge.

A perpetual day, with no event, no change and no action in it, would give us "no suspicion of time." But human experience, and, indeed, that of all sentient life, is as discrete and granular as matter is. If matter were a "plenum," as the ether is supposed to be, space could never become "known" to man, with his present equipment of sense-organs; and if we take into account the nature of energy it is more than doubtful that a sense, capable of doing it, could ever be evolved.

And in like manner, if life's experience was a

“ continuum ” or uniformity, the idea of time would never become part of consciousness; in fact, there would be no consciousness of which it could form a part.

Time has two characteristics, *succession* and *duration*. While change is in progress a phenomenon is known as a performance, action, operation, or process. It has a beginning, a middle, and an end; that is, it has duration. But when it is viewed as completed and past, its duration, whether it be short or long, vanishes from thought, and is looked upon as a thing without dimension. It is called a deed, an incident, or an event, and, as such, a phenomenon has only “ succession ” as its constituent element in the composition of knowledge.

Now, if one examines his own life during any definite period, say a day, a week, or a month, he will find that it consists of a series of changes, of doings and experiences; or when past, of deeds and events, which succeeded each other much as waves do on the sea-shore. No sooner does one break and vanish on the beach than, in the distance, another emerges into view. They are separated by definite intervals, while each wave endures from its emergence to disappearance. Thus from day to day, as well as from year to year, our life is a string made of duration and succession, and is beaded with doings and events.

We may point out, in passing, that though space and time are not sense-perceptions, and are seen only by the eye of reason, yet their existence is inherently implanted in the nervous and muscular systems of every living creature.

By means of language in the artificial process of education the horizon of our knowledge of the contents of time can be enormously enlarged in all directions so as to include an area vastly in excess of that which is possible to individual experience. In this respect, all histories do exactly with regard to time what a knowledge of geography does in respect to space. It informs you of processes and events which lie not only outside the experience of the individual, of his age or nation, but also of that of his race. It gives speech to the rocks to tell what transpired before the advent of life, or even the birth of the planet. Such are the triumphs of reason in its survey and study of the contents of consciousness.

SPACE AND TIME COMPARED.

It may be profitable, before we quit this part of the subject, to compare and contrast the characteristics of space and time, with a view to discovering their differences as constituents of knowledge. One difference is seen in the ease or difficulty with which they are registered in the mind. Objects are easily remembered; events are not, except to the extent that they involve visual elements. "Yesterday," "the day before," and "last week" are ideas which the child learns only very slowly. The "now" in time corresponds to the "here" in space. But the "here" and "there," *i.e.*, co-existence, may be seen simultaneously, and therefore photographed together in the mind, whereas "yesterday" and "to-day" do not form part of a common experience; consequently "succession" cannot be registered at the same in-

stant. The former depends entirely on memory, hence the slowness in learning time-relations.

Another fundamental difference is seen in their respective susceptibility to measurement. Space is in reality the only measurable thing known, as nothing else can accurately, or even approximately, be measured in *terms of itself*. We cannot make a unit out of "duration" and measure time with it. We are, therefore, compelled to measure it, as was noticed in our last chapter, in terms of space on the dial of a time-piece, or by some other spatial device. We can no more fix on a unit of duration than we can on a unit of pain with which to measure a tooth-ache or the agony of grief.

Duration is magnified or diminished according to the nature or character of the sensation involved. A painful feeling lengthens a second into hours or days, according to its intensity, and a pleasurable one correspondingly shortens it. A week of excruciating agony is to the sufferer a century, while a painless sleep blots it out of existence. The difference between them is, however, more fundamental and intrinsic still. They may, without abusing the meaning of terms, be regarded as the two complementary dimensions of existence—space, of substance and constancy; and time, of energy and change.

Space is essentially *cubic*. To break it up into its dimensions is simply a piece of artificial dissection, but a convenient device. Length, breadth, and height are, individually, no more space than are the head, the trunk, or the limbs the body of the animal organism.

Time, on the other hand, is essentially *linear* (to

borrow a spatial metaphor, as we needs must). It is the dimensionless channel along which the waves of change, due to the everlasting redistribution of energy, follow each other throughout the realms of space, whether they are or not mirrored as feelings or sensations in the consciousness of a sentient being. Space is a void in which substance resides, while time is the ever-travelling, non-existent tape, the spools of which are two eternities, the past and the future, on which the incessant *changes* of this substance are for ever being recorded as it speeds along to the oblivion of the eternal past by the die of Fate.

CHAPTER X.

KNOWLEDGE: THE FUNCTIONING MIND.

CAUSATION.

CAUSATION is a principle which rules throughout the physical universe without respite or intermission. There is not a spot in space or an instant in the flow of time at which its sway is not absolute. It means that all phenomena are linked together by a relation of sequence such as that which obtains between parent and offspring. In other words, that there is no such a thing as an isolated phenomenon any more than there is a child who had no parents. And just as one has a sense of knowing a stranger if he knows his parentage, so does he feel towards an event if he can, on the testimony of his senses, connect it as the outcome of some well-known force or phenomenon. Now, in the inorganic or lifeless world we denote this offspring-like relation by the terms "cause" and "effect." As was said above, it is a relation which is vividly represented by that between parent and child; for the alternately recurrent phases of age and youth, between which the ever-advancing wave of life oscillates, are only a re-duplication of that fundamental alternation that reigns eternally in the physical universe in the principle of causation.

Even primitive man, in the twilight of his self-

conscious dawn, discovered this relation, though, in consequence of the diversions and aberrations of ignorance and the dimness of the light, the "images" formed on his mental retina were much blurred and grotesquely distorted.

The sense of mental repose and intellectual satisfaction which we experience on being thus able to connect any incident with its physical antecedents finds expression in such remarks as: "I now understand it," "I can explain it," or "I can account for it." The words "understand," "explain," and "account for" possess an emotional element obviously akin to that which we experience on being able to classify a strange object. At bottom the emotion accompanying the understanding and the recognizing is of the same kind. To know one's parents is to an extent a knowledge of a person; and likewise, to know the antecedent impulse and conditions of an occurrence is to understand the event.

As the term "cause" has borne more than one meaning, it would be well, before we proceed farther, to consider them. Formerly it was mainly used to denote a metaphysical entity which produced effects. It is true that this phantom was usually confounded and identified with physical causes, or substituted for them; and it is equally true that this identification was, on the whole, unconsciously made by those who did it. This was the "dragon" which Hume undertook to slay. But he did it as a metaphysical knight, and his method is unsatisfactory to many, as it created, or tended to create, a misleading impression with regard to natural causation. He should have clearly indicated

the meaning of the contact and sequence of which he found "cause" always to consist. The principle of physical causation was no myth because the metaphysical phantom was one.

Using the term in its widest or universal sense, the cause of an event may be defined as the *tout ensemble* of its physical and psychic antecedents. When it refers, however, to some particular event, the term usually denotes only one component of the causal group—the one that is uppermost in the mind at the time. In this sense it is often, and more accurately, described as "the exciting cause."

The principle of causation is intrinsically bound up with the principle of energy. For the energy of the universe is in the state of everlasting redistribution, because the forces it develops perpetually oscillate from a state of equilibrium to one of instability. As soon as a force or impulse becomes instable or unbalanced, be it psychic or physical, it produces movement, and the energy involved is re-distributed. It is to this unbalanced impulse, be it a physical impulse or a motive, that the interrogative "Why?" usually refers.

But in the organic world we are in the presence of a catastrophic change. For in the realm of living things, effects or "events" are all designed and purposive, instead of being spontaneous and purposeless as in the physical universe. In a sense an effect precedes its cause, for each is pre-determined. The factors which make up the causal cluster have to be placed and marshalled "to order" to produce the specific end fixed in advance. But a particular end demands a

particular causal group—a situation that brings into the domain of causation entirely new adjuncts—the whole paraphernalia of “ means to ends ” for the purpose of collocating, adjusting, and co-ordinating the various substances and agents, the energies of which are necessary to secure the one particular effect required. It is to these spatial, temporal, and instrumental conditions that the particle “ How? ” usually refers.

The animal body, for example, is such an assemblage of “ means to ends.” It is a mass of physical and psychic contrivances to achieve a double purpose, *viz.*, to maintain life in the group of “ means and devices ”—the body—and to perpetuate the species. Thus the principle of causation is implied in every organ, gland, and secretion, and is implanted in every sense and instinct we possess.

Man, in virtue of his self-consciousness, has made the area of purposive activities virtually boundless. To him the imagined or pictured future becomes a source of a new set of impulses, to which we give the special name of “ motives.” These have wholly revolutionized the aim and scheme of human behaviour.

It may be mentioned in passing that effects, like attributes, are divisible into two kinds—the wholly subjective, like the intoxicating effects of alcohol, and the mainly objective, as when alcohol burns, and melts glass or metal, in which the subjective element is merely functional and subservient.

The object of this essay, it might be pointed out, is not to trace causation to its prime elements, but to direct attention to the vastness of the extent to which

causal relations enter as an essential constituent of all knowledge. We may say without fear of contradiction that civilization itself, in all its phases, is the outcome of the discoveries of causal relations as now embodied in human knowledge. Every trade, industry, art, and craft essentially consists in applying the accumulated wisdom reaped from the experience of the past to the production of desired effects. To this end every trade and craft possesses a special store of practical wisdom, which it conserves and perpetuates from age to age.

According to the present economic structure of society, the labours of the bulk of its members are causal in a double sense.

They produce or distribute various commodities for the use, comfort, convenience, or luxury of the rest, or to provide it with some useful or agreeable service. But, in addition to this, most vocations are causal in a personal sense, as a means of providing a livelihood for oneself and family.

Just think how this general truth is exemplified in the most ancient of human pursuits, *viz.*, that of the farmer. It consists of a series of operations of spatial adjustments with a view to providing the *tout ensemble* of conditions essential to the growth of crops. The farmer ploughs and manures and sows and harrows, operations involving the use of implements and means for transporting, collocating, and manipulating materials with the object of fulfilling the spatial and temporal conditions necessary before their energies can co-operate with those of the rain and the sunshine. And the crops of the summer and the autumn are the result.

In like manner the operations of harvesting are again causal and purposive. The crops which were the "effect" of the tilling and sowing have now become "cause" to subsequent events. They are mowed, dried, garnered, thatched, threshed, and ground to provide man and beast with the means to live. And this avocation is typical, in respect to the purpose of toil, of the majority of human pursuits.

Of avocations which provide, instead of commodities, some necessary or desirable service, we may instance the medical profession. It is essentially based upon the assumption that it knows the causal conditions of healing and of health, and of the art of applying them.

The life of those who set out on the amassing of a fortune illustrate the truth in a manner exceptionally conspicuous. All their struggles, toils, plans, schemes, sacrifices, and thoughts stand in a causal relation to the object of their ambition. And even the fortune, if won, is intended to serve as cause—as a means to gain some social distinction for oneself or family.

Moreover, even social institutions are causal in nature and purpose. Think of education, for example. Its object is to stock the mind of the rising generation with a portion of the accumulated wisdom and experience of the race, and to drill the intellect to use it with effect. And so is every reformative movement, whether it be legislative or social. It is to remove some evil, or to secure some better condition of life, to which end the reform is to be instrumental.

Thus, every period of one's life is causal to that which follows it, and, as already indicated, the entire span of our earthly existence, with all its worries,

struggles, and turmoil, is in the most absolute sense only a causal period, out of which the next generation emerges as its effect.

CHAPTER XI.

KNOWLEDGE: THE FUNCTIONING MIND.

SUMMARY AND LESSON.

LET us now cast a retrospective glance over the ground we have traversed, with a view of bringing into higher relief the main facts noted, and of indicating the lesson taught by them.

Before we began inquiring into the meaning of knowledge we made a brief preliminary study of our sense organs. We did it first prospectively, seeking an answer to the question, "What is the meaning of our organic sensations and sense-impressions?" (if they have any). And we experienced no difficulty in finding the answer to it, for it is palpably obvious that, with no exception, they are all means to an end, and as that end is the same as that of the entire organism, there is no possibility of mistaking it, *viz.*, to maintain its own life and to perpetuate the species. One or other of these two ends is the definite aim of every sensation and sense-impression in the entire contents of mind.

We then considered them retrospectively or genetically, and observed that every sensation, both agreeable and painful, is due to some organic changes in the tissues of the body, and, likewise, that every sense-impression made on its peripheral "outposts and watch-towers"—the sense-organs—is the concomitant

of some re-distribution of energy—an absorption, a release, or an expenditure—by or in the substance of the organ concerned, so that each sensation and sense-impression is a psychic symbol or hieroglyph representing in consciousness the physical changes which take place in the material body. They get both their meaning and explanation entirely in their physical or corporeal setting.

Subsequently, we turned to the mind itself, in further search of the prime elements of what we call “knowledge” or “knowing,” and found it to be a “conglomerate” of four relations: (1) the relation of a sense-impression to previous ones, as to whether it is like or different; (2) the relative dispositions of objects and events in space; (3) their relative order and sequence in time; (4) and their physical descent or parentage, *i.e.*, out of what collocation of conditions and forces did they emerge, and to what changes can they in turn give birth? These are all the elements which enter into the composition of knowledge, and they may be called, respectively, its mental, spatial, temporal, and causal constituents. The first is mental pure and simple; the others are so only indirectly, the relations themselves being “outside” the mind.

If these four be known in respect to any object or event, knowledge of it is complete, since consciousness is aware of no other aspect under which to relate it. It is obvious that the sum-total of such “threads and lines” of relation constitutes the whole of one’s knowledge. But genius consists rather in the possession of a superior capacity for detecting obscure and distorted relations than in the magnitude of this totality.

We observed that the animal mind is a compound of the very same four elements, the one difference being that in the sub-human creature they are only tacitly known by being implied in structure or implanted in instinct, whereas in man they also exist in self-consciousness as *ideas*. For this purpose he has evolved in language a fluid receptacle of sound in which they are held in a manner fancifully analogous to the device of the bee for storing its honey, the words of speech being the "cells" of ideas. And, as we said above, what is true of the simplest idea is likewise true of the most composite or complex. You may repeat your abstracting process until the original is lost to view, and you may combine, compound, and permute the results of your abstractions to your heart's content, but you do not uproot by the process a single idea from its physical soil. You may succeed to camouflage its source with verbiage—a favourite performance in metaphysics.

Let me now give two examples of how composite ideas are built up from their elements.

The first is from mixed mathematics. Starting with displacement or motion, which, as we saw, implies space, we combine it with the idea of time, and we get the idea of "rate of motion," *i.e.*, of speed or velocity. Now combine this idea of speed with that of mass and we get the idea of momentum, or "quantity of motion." Combine this momentum with time once more and we get the idea of "rate of change of momentum"—an equivalent of the idea of force. Combine this last again with space and we obtain the notion of energy or work. And, finally, if we again

repeat this process by compounding the idea of force with that of time once more, we arrive at the conception of power in the technical sense of "rate of doing work," or what is now usually denoted by the term "activity"—an idea of no less than six dimensions—mass once, space twice, and time thrice.

Next let us take an example from the other function of mind, the feelings, and consider the relation between human behaviour and sentiency. If you abstract the incentive feelings which produce or cause agreeable sensations or emotions, and idealize them under such terms as love, mercy, or righteousness and their opposites (as divine justice, righteous indignation, or holy wrath), the effect of the actions prompted by these feelings upon sentient beings will be precisely the same, whatever be the emotional associations of the terms by which the incentives are denoted.

It would be dishonest on my part to leave this subject without drawing attention to the important implied truth taught by the discussion. The obvious corollary from it is the essential absurdity of the practice of ascribing mind, or any of its elements, to imaginary incorporeal existences, such as spirits, ghosts, spooks, or gods.

Let the reader but reflect and he cannot fail to realize the palpable and suicidal inconsistency of endowing "imaginary beings," which by hypothesis have *no relation with matter, energy, time, or space*, with mind whose sole function and meaning is to enable the organism to put itself into matter and energy, so as to maintain its corporeal spatial and temporal harmony with an environment of

existence and to perpetuate the species. Is it possible to conceive of an absurdity more grotesque, or an inconsistency more palpable or preposterous?

Such an ascription would be normal in the case of a primitive savage, but in the case of a civilized person of the twentieth century it is wholly unnatural, and is made possible only through the warped state in which the intellect is left by the distorting influences of conventional education.

It is as absolutely anthropomorphic to endow the gods with emotions and intellect as it is to equip them with legs, arms, palate, and nostrils. When will people realize, or be allowed to realize, the truth of so obvious a fact?

I know of no sadder spectacle than that of the bereaved wishing to die, so as to join the departed in "the other world," and who often commit suicide in that belief. I say "sad," not on account of the cruel delusion involved, for delusions are often sweet and pleasant, but because the state of mind betrayed by it indicates how false a guide is our educational machinery for bringing man to a true knowledge of himself and his environment.

Some persons use the expression "creative mind," but until they can justify it by giving proof of its ~~existence and magic potency~~ and by stating catagoric-

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ERRATUM

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Such an ascription would be normal in the case of a primitive savage, but in the case of a civilized person of the twentieth century it is wholly unnatural, and is made possible only through the warped state in which the intellect is left by the distorting influences of conventional education.

It is as absolutely anthropomorphic to endow the gods with emotions and intellect as it is to equip them with legs, arms, palate, and nostrils. When will people realize, or be allowed to realize, the truth of so obvious a fact?

I know of no sadder spectacle than that of the bereaved wishing to die, so as to join the departed in "the other world," and who often commit suicide in that belief. I say "sad," not on account of the cruel delusion involved, for delusions are often sweet and pleasant, but because the state of mind betrayed by it indicates how false a guide is our educational machinery for bringing man to a true knowledge of himself and his environment.

Some persons use the expression "creative mind," but until they can justify it by giving proof of its existence and magic potency, and by stating categorically what it does create, not in a metaphorical sense (a Materialist might well do that), but literally, we are fully entitled to state that the phrase is absolutely without any significant meaning, and consequently to denounce the practice of using it as wholly disingenuous.

CHAPTER XII.

THE INDISPENSABILITY OF CONSCIOUSNESS.

A GOOD deal has been written as to whether consciousness is a necessity in the economy of animal life, or something which could be dispensed with without in any way affecting animal behaviour.

The muscles get their impulses from nerve and brain, and mind, without their co-operation, cannot stimulate a single muscular fibre to action. Why, then, should there be any need of mind? What use is it? Is not the animal organism a complete automaton—a self-determining machine—with its afferent nerves bringing impulses from all parts of the body to the spinal-cord and the brain, which reply along the efferent nerves, and immediately the muscles obey the orders given them.

Besides these reflex actions in which the organism responds to external stimuli, most, if not all, of the changes and activities which take place within the body are of the nature of chemical or physical reactions. Some are rhythmic as well as automatic, like the beat of the heart and the action of the lungs. Some resemble the action of a flushing tank; others are exactly timed to conditions, like the slide valve of a steam engine. For example, as soon as food enters the

mouth, the stomach, or the intestines, digestive fluids are immediately poured into the alimentary tract; while others, again, are of the explosive type, like the charge of a gun or a shell—a release of pent-up energy. All katabolic action is certainly of this order. And, by the bye, are not feeling and thought obviously the accompaniments of such katabolism?

Now, it is highly probable that such reactions make up all the changes of which the process of “living” consists; and nowhere, under normal conditions, is consciousness in evidence. It intrudes itself only when something is out of gear. It is not awakened even by the heart beat, despite the greatness of its contracting force in overcoming the resistance offered by the boggy mass of the capillaries. Apparently there is no gap left anywhere which calls for the intervention of consciousness. The animal looks like being a complete automaton; so that nature, on this view, evolved a thing which is wholly unnecessary. And since evil, in all its forms of suffering and agony, has no existence apart from consciousness, Nature has proved itself to be a fiend at heart in having made the animal automaton *sentient*—a sufferer—without the least need of it, if the hypothesis be true, that it could live its life just the same without it.

But can we grant the “if”? I trow not. In the above account there is a missing link, a causal gap, and one of such cardinal importance that the whole chain is worthless without it. Had Nature provided that food should be poured into the mouth of every living creature as it wanted it, just as the “hopper” feeds the mill with grain, then surely consciousness

would be no more wanted than it is in the vegetable kingdom. But, alas, is it so? What Nature has done is to provide the mill itself with a motor system in the form of muscles, to go in *search* of the "grain" and feed itself.

It is here at the very beginning of the vital process where mind comes in. Providing the organism with a muscular system for self-movement—that is, making it an automobile—brought with it the necessity of also providing a driver, a chauffeur, to control and direct its movements. Indeed, so essential is mind to the living machine, both as feeling and intellect, that we — have on several occasions used the phrase "mind and muscle," to emphasize the fact that they are indissoluble correlates in all sentient creatures; and I trust it will need but little reflection on the part of anyone to realize this obvious truism.

I invite the reader to put to himself the question: Does the finding of the particular substance which every creature must have in order to enable it to continue to live belong to any of the reactions—rebound, lever, or trigger type—instanced above? The absurdity of the question will suffice as an answer. The *finding* is not the effect of a reaction at all. It is the response of the mind to one sense-impression out of a multitude. The "finding" is not physical, but mental; it is the act of recognizing or identifying the mental image which the dint of infinite repetitions in the life history of the species has made familiar in consciousness by being the very means of its perpetuation. Recognition, be it in discovering an eatable or in avoiding the fate of being eaten, is the mind's premier "instrument"

in the great struggle of existence. It gives to a chance encounter the same effect as a pre-determined mechanical device—a fact to which it owes its predominant importance amid the functions of mind, and which makes it the primary constituent of knowledge.

Fear plays a more important part in determining the movements of animals than even the impulse of hunger, for partial or imaginary recognitions awaken it. A horse will shy at a paper as readily and as impetuously as at the sight of a lion. To this mental factor is due the fact that the movements of sentient creatures are characterized by a spontaneity which we usually associate with the notion of “free-will”—that perpetual change of direction which makes the path of a fly or a swallow during any instant never an exact repetition of a previous one.

To contend that it is not the sense of hunger but the reaction due to the defect of nutrition in the system that sends the wolf to roam through forest and meadow, the hen to scratch on the dung heap, the mole to burrow the soil, the swallow to sweep through the air, and the cat to watch with the immobility and stillness of death, is a theory too inconsistent with the teachings of mechanical science even to be discussed as a problem of dynamics. And so is the contention that the cat seizes and devours the mouse not from the mental act of recognition, but because the radiant energy represented by its retinal image of the mouse, in whatever position and in whatever degree of light it happens to be, is always the exact amount of energy to set its muscular system in motion, and is, moreover, the only one object whose image will

represent that amount ! Well, a person who can discuss such a contention with a straight face should find no difficulty in believing the story of Jonah and the whale.

The possibility of recognition is implied in the searching; it is that which gives meaning to the search. The creature is seeking for something which it will recognize when it comes into view. Mind in virtue of this capacity performs one of Nature's premier miracles, *viz.*, to make behaviour purposive, though full of contingency, to make chance subserve an end as definitely as if it were designed by crank and cam in the structure of a machine.

Mind or consciousness is Nature's telephone exchange. The feelings give the "calls," and the intellect, with its six attendants—the senses—connect them up with the called-for muscle or set of muscles, with the result that the creature continues to live. And knowledge is simply a name for its states when it fulfils its "exchange" duties—those life-preserving functions for which it was awakened and evolved.

How neural and psychic processes are causally "geared" together we cannot explain. Cause and effect simply imply a redistribution of physical energy. But feeling and thought are extra-physical and non-material. How we should love to know why consciousness is associated only with living substance, and also why it is fully awakened within it only when that substance reaches the highly organized state of the animal brain, and yet from the nature of knowledge man has little hopes of ever knowing it, as the explanation is probably to be found in the nature of

ultimate substance. But this inability to explain casts no shadow of a doubt upon the fact itself; there is not in the whole contents of consciousness a relation more obvious and absolute.

PUBLISHERS' NOTE

SINCE this little work was written, "Keridon's" view or theory of life, as expounded herein, has received a remarkable endorsement in a book on *Biochemistry*, written by Mr. Benjamin Moore, and quoted with approval by Dr. M. O. Forster, F.R.S., in his recent Presidential Address at the British Association on the arresting subject of "The Laboratory of the Living Organism."

As will be seen, "Keridon" looks upon the living cell or organism as simply a seat where alternate storings and dissipations of energy occur, or rather as a contrivance at which the energy of a stream passing through it is undergoing continuous transformations. By way of exemplifying and enforcing this truth, he makes use of the phenomenon of a flame or fire, which, though representing only one-half of the living process, was nevertheless its best inorganic analogue.

So convinced is Dr. Forster of the truth of this view that he refers to the living cell by the name of "energy transformer," in which, as in all transformers, the principle of the conservation of energy is fully maintained.

Again, "Keridon" draws the reader's special attention to the difference between living and lifeless energy by emphasizing the point where the fire analogy fails—viz., in the fact that it possesses no power or inclination to feed itself or perpetuate its kind. This difference Mr. Moore likewise emphasizes by coining a new phrase—Biotic Energy—to embody it, of which he says that "it is just as closely, and no more, related to the various forms of energy existing apart from life as these are to one another"; and that "its most characteristic feature, distinguishing it from all other forms, is its power to proliferate"—i.e., to propagate its kind.

Confirmation or agreement could hardly be more complete.

Not less remarkable is the virtual endorsement of the views expounded in the remaining essays by the distinguished and famous President of the Psychological Section, Professor Lloyd Morgan, D.Sc., F.R.S., in his address on "Consciousness and the Unconscious." The virtual identity of view or creed is only hidden by a difference of terminology. "Keridon's" successive "awakenings" are the equivalents of Professor Lloyd Morgan's "emergent qualities." Again, the author stresses the fact that "re-cognition" is the cardinal and primary function of mind as intellect. So, in the address, "revival" or "againness" is made the first item or note in "The Chord of Consciousness": "Consciousness is always.....a measure of revival begotten of previous behaviour"; "a matter of subsequent occasion, and always presupposes a precedent occasion." And so throughout the address the lines of thought again and again run parallel or coincide.

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