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ORDINARY MEETING.*

THE REV. CANON GIRDLESTONE, M.A., IN THE CHAIR.

The Minutes of the last Meeting were read and confirmed.

The following paper was then read by the author :—

THE NATURAL AND THE ARTIFICIAL. By ALFRED T. SCHOFIELD, Esq., M.D., M.R.C.S.

NO one can be more conscious than myself of the impossibility of advancing Science, in the narrow sense of the word, one step by means of metaphysics or any form of *a priori* reasoning. But there are so many questions connected with science and there is so much in the wider aspect of the word that is as yet unknown, that although such questions may not be resolvable by experiment or by the chemist's test tube and balance, they are yet of such wide interest and great importance as to be well worthy of the attention of this Society.

It is now generally admitted that all questions as to origins and first causes are in their nature only to be approached by deductions and inferences and methods of *a priori* reasoning; and scientists themselves, though allowing nothing within the narrow range of their text books to be asserted without proof, are not at all slow to affirm and deny on many subjects that are outside demonstration.

It is true that of late years the sceptic as well as the believer have been partially displaced by the agnostic, and

* 5th Meeting of 30th Session.

more caution is certainly observed in making unprovable statements, and probably in future such utterances will become still more guarded.

Not being a scientist I must be pardoned, however, if I do not strictly observe this caution, and state, somewhat strongly, the conclusions at which I have arrived, even though they be in their nature incapable of scientific demonstration and be often rather matters for faith.

It is astonishing after all how much faith there is in those who often repudiate it. Most sciences rest ultimately on faith in the unknowable or at any rate the unknown. The phenomena are pursued further and further back by experiment and investigation; for the belief in causation is a primary conviction of the human mind. We instinctively feel that no phenomenon can be causeless, and travelling backward by scientific methods we invariably reach a point where demonstration is no longer possible, and where inference and theory, and belief in such theories must begin. We find that the assumption of a first cause is a necessity of thought and also that the first cause must itself be uncaused, in other words that the relative must spring from the absolute or—in Christian phraseology, which is at least as intelligible—that the Creation must spring from the Creator.

Human reason is surely degraded by declaring the existence of God or creation by Divine power to be *unthinkable*. It is of course in its detail unknowable, inasmuch as the finite can never reach to the infinite, the relative to the absolute, the conditioned to the unconditioned. But we succeed in thinking of and believing in a large range of existences that are unknown and probably unknowable; for the limits of thought and belief are not those of knowledge. Ether is as incomprehensible (in one sense) as the Deity—a supposed medium of indefinite extension, of inconceivable tenuity and yet transmitting vibrations according to the laws of solid bodies. Light is, if possible, more incomprehensible still, for though we may postulate the waves, we have not even a working theory as to the moving agent.

But we must not now pursue this point. As a matter of fact we know nothing in its essence, and matter is now seen to be as unknown to us as mind: nevertheless, the moment the agnostic says "I am" he commits himself in faith to the unknowable.

I have selected the two words at the head of this paper rather because I think their consideration may afford food

for thought and profitable discussion than because I have anything strikingly original to offer to this learned body with regard to them.

The exigencies of science are so increasing with its extension, that it is said now to require fourteen years merely to become acquainted with what is now known in chemistry. The span of life not being augmented, the range of knowledge in the individual is being constantly narrowed as its depth is increased, and multiplying subdivisions in science are become a necessity, with the unfailing result that the horizon is contracted, and the scientist resembles rather a miner at the bottom of a pit than an explorer of new territories. The philosopher with his broad generalizations is transformed into a specialist of narrow accuracy, who ill conceals his contempt for his former self.

The "natural" means in its etymology that which is about to be, or that which is so unfailing in its occurrence as to be confidently predicted; being the production of constant laws. What the word means in its use it is impossible to say, the word "nature" being used as a synonym for God in one breath, and for a man's habits in another.

Nature may not be unfairly described as the impersonal deity of many scientists, who invest it with law-giving power; all observed principles of force being called "laws of nature."

We would, however, to avoid confusion, use the word mainly in its contrast to "artificial," as meaning that which is expected to occur; whereas the artificial is the result of the capricious art or artifice of man. "Natural" may of course be contrasted with "spiritual," and with other words accordingly as we look at some of its many sides; but at present we will confine our attention to its use in this one aspect. It will be necessary, however, to clear the ground as we approach our subject, by a brief consideration of the inorganic and organic world, relatively to which these words are used.

It has been beautifully said, "God in eternity eternally sees time, space, the universe. In *time* He sees the finite expression of His eternity; in *space* He sees the finite expression of His infinity; while in the *universe* He sees the finite expression of His being."

Time and space, however, are merely duration and extension, they are not "things" but impressions or projections of

mind, known to us only by matter and motion, without which they could not exist.

Turning to the third, "the universe," we find something more than a mere projection of mind, we find "a thing"—consisting of, some say, three, and some, two parts—of ether, matter and force, or of ether and force only.

Matter is believed now by many to be resolvable into ether, but ether is a creature of faith, not of demonstration. Disciples of this school therefore arrive at the somewhat startling conclusion that the foundation substance of all sciences is to them at present little more than a projection of their own minds.

The matter on our earth is composed of some seventy-one elements, the mass of the world being however built up of about a dozen, the remainder being apparently little used. Life itself has a physical basis of but four or five, and water and air two each.

These elements consist of molecules, formerly supposed to be composed ultimately of hard indivisible atoms. Although these atoms are merely "believed in," nevertheless some attempt has been made to guess their size, and it is asserted that 100,000,000,000,000,000,000,000 are contained in each drop of water, a statement we are not in a position to deny.

Some more modern scientists, feeling sure that even an atom might be divided, were there a knife thin enough to cut it, commit themselves to points or centres of force (of Boskovitch) having no magnitude, being the ultimate constituents of matter; or in short that matter has no objective existence at all, but is merely a form of force. Others again, to whom we have already alluded (Helmholtz and Thomson), occupy an intermediate position, and believe matter ultimately to consist of what is a little less than matter, and yet a little more than force, and that is ether. Finding that air coloured with smoke, by rapid rotation in the form of rings, can be made to move through air, as a foreign and independent body, they said why should not ether, if formed into vortex or rapidly whirling rings, move independently in ether as of it, and yet not of it; ether at rest having, it is allowed, none of the qualities of matter, save perhaps inertia.

Having got thus far in metaphysical physics, and found, moreover, that the contact of rings of air produced vibrations, and agreed in their behaviour with the supposed movements of the imaginary atoms, it was comparatively a

simple matter to find out that each of these imaginary ether ring vortex atoms would be $\frac{1}{5000}$ millionth of an inch in diameter, or in other words if a drop of water were the size of the earth each component atom or ether ring would be the size of a golf ball. It was also "found" that each could exist in a solid, liquid and gaseous state, and that in the latter each ring would be $\frac{1}{700000000}$ th of an inch from its neighbour, which in the case of hydrogen it would strike some 17,700 times a second.

Now all this may or may not be so. Its mere consideration is a valuable exercise in mental gymnastics, even if it leads to nothing more; but at any rate, though the result is rather difficult of conception, the ingenious methods by which it is reached are logical and fairly coherent. When we turn, however, from matter to force many of the theories we are expected to believe are far otherwise.

Matter and force are both objective, but it is well to remember, in passing, that many of the phenomena of the former are purely subjective. We talk of light and sound, the former consisting of supposed waves of ether of an average length of $\frac{1}{500000}$ inch, and the latter of waves of air averaging about a foot, but light and sound are nevertheless both subjective phenomena, and do not exist outside consciousness; as a stick travelling through the air is not "pain" till it strikes. These waves are not in themselves either light or sound.

To return. When we compare the carefully considered though startling statements of Helmholtz and Thomson on matter with such a sentence as the following: "Energy is always associated with matter and probably *is* matter in motion," we feel that the latter clause essentially confuses cause and effect, and must therefore be rejected, whereas the former is at any rate not contrary to reason.

What then is force or energy? We talk of the laws of nature, but these laws are not made by nature nor are they even in themselves the origin of power. They are merely the expressions of a power that acts uniformly.

Professor Tait, in a close chain of reasoning that cannot be too highly valued, points out that the fact of motion and the determination or direction of motion are essentially different. The forces of nature are heat, light, electricity, gravitation, chemical affinity, etc. The mystery is not what are the forces that move particles, but what is it that guides and determines the manner and direction of the movements; for

we cannot conceive force acting apart from manner and direction. It has been well said that the laws of nature are not causes but courses. Force cannot be self-directing. Moreover, and this cannot be too strongly insisted on, neither can matter, direct force, or matter, or motion, or anything else; for its primary property is INERTIA.

The movement of a body is not determined by the action of a force, but by the manner of its application. It is easy to say bodies move in the direction of least resistance, or in a direction determined by the resultant of the forces applied; but who applied the forces, and what determined their direction, on which the movement of the body depended?

At any rate it was not another force, for that only carries us a stage further back in the inquiry, and a careful consideration will make the following statement perfectly clear, "That the action of a force cannot be determined by a force, nor can motion be determined (that is directed) by motion."

Look again at the results of these forces; their action may be blind, but their results are not, and therefore what determines them is not.

No force can possibly account for the objective idea in nature.

Every atom or vortex ring must be made with forces or affinities determined in definite directions and amounts, so as to form the definite and exact compounds that compose this universe; indeed, we may go further and say no vortex ring is conceivable without the conception of a determining force that causes its revolutions.

Sir John Herschell said, recognizing the quality of mind in force, "The exact likeness of all molecules of each sort to each other gives them the essential characteristics of a manufactured article;" and it must be remembered that as far as can be ascertained matter everywhere in the universe is alike, and is divided into the same elementary bodies.

Moreover, the laws and properties and forces we observe and so dogmatically tabulate in the various sciences may not after all be fully understood, for although the forces of nature seem to be always determined in the same direction and intensity, it may not really be so. Philosophers in the summer might formulate laws from observing the properties of water, all of which would be found to be modified unexpectedly when the winter brought the first snow or ice; and it is quite possible that our little summer existence on this globe, as

compared with the eternity of the Infinite, may not have reached into the winter before and behind us! Indeed, there are indications, in the impossibility of accounting at present for the source of the sun's heat and other problems, that the laws of heat and light observed by us may not always have applied.

Seeing then that no force can act without determination or direction and that this ultimately can depend neither on matter or force, we are driven to what after all is the only rational conclusion, and that is that determination is the result of mind, and if we ask whose mind, the answer can only be the mind of the Infinite.

Professor Tait reaches this conclusion when he says, after elaborate arguments extending over hundreds of pages, "The determination of all things can come from God alone."

Lord Brougham says, "The evidence for the existence of mind is more certain and more irrefragable than for that of matter."

Dugald Stewart sums his arguments up thus:—

1. Every effect implies a cause.
2. Every combination of means to ends implies intelligence (*i.e.*, mind).

Let us then cease to attribute this intelligence to nature, as for instance, "Nature's cunning contrivance stores up coal and reveals it to men when needed."

This nature is a fiction and a fancy and is only such a favourite inasmuch as it offers a superficial escape from the necessity of recognizing a supreme Being. The reality is a great creative mind of omnipotent power; above, but in sympathy with his whole creation: in other words, God.

That mind is the cause of force-action is, however, denied; for we find such men as Tyndall (*Fragments of Science*) saying in a comparison between the pyramids and rock crystals, "While the blocks of Egypt were laid down by a power external to themselves, the molecular blocks of salt (matter be it remembered, whose first quality is inertia) were self-positing; being fixed in their places by the forces with which they act on each other." He here advances the amazing idea of a self-determining power as the attribute of a molecule.

Dr. Nicholson, in a paper read here some time ago, says that force is or may be an affection of matter, an idea to my mind equally confused and confusing.

Herbert Spencer takes the other side and sees nothing in

the origin of the universe but "mere" force or energy, and in the progress of the universe nothing but spontaneous evolution. The word "mere" is so admirably out of place in this sentence that its bias stands self-revealed. Are not bigotry and partiality as great dangers for the agnostic scientist as for the Christian philosopher?

And yet in another connection Herbert Spencer truly says, "By the persistence of force we mean the persistence of some power that transcends our knowledge and conception. The manifestations do not persist, but that which persists is their unknown cause." And this is so invariable that the manifestations can be tabulated and called laws; and scientists, however sceptical, are so sure that the universe is the work of the highest intelligence that they set to work in faith on observing a phenomenon to discover its fixed laws; for the reason that a law is fixed must be because it is perfect for all time. This shows perfect fore-knowledge, power, goodness, and wisdom. It has been beautifully said that if we throw dice the same twelve times we do not attribute it to chance, but say they are loaded. So is the fixed order of the universe "loaded" with Divine wisdom and the same law acts uniformly in the awful distances of the starry depths as in the component atoms of a molecule of water.

The merely material conception of the universe is truly unthinkable, for we only know matter by mind, the natural by the spiritual, and such a conception necessarily excludes "force" which is not material.

Dr. Reynolds shows it is absolutely inconceivable that COHN should be otherwise than indifferent to their position in matter past, present, or future, and even if we advance a step and allow the question of non-material mechanical forces and regard the universe as a mechanical toy, we still have to consider its construction and the mind required to produce such a result.

Cicero very well rebukes the modern philosopher. He says, "The man who believes that the world was made by the chance meeting of atoms will believe that the letters of the alphabet shaken out on the ground will form the annals of Ennius (or Socrates or Plato)!" And yet, as we shall see, men do believe regarding *natural* phenomena what they regard with scorn in *artificial*.

Dr. Reynolds ably sums up the question. "The consciousness of an inscrutable power manifested to us through all phe-

nomena has been growing clearer, and must eventually be freed from its imperfections. The certainty that on the one hand such a power exists, while, on the other hand, that its nature transcends intuition, and is beyond imagination, is the certainty towards which intelligence has from the first been progressing. To this conclusion science inevitably arrives as it reaches its confines, while to this conclusion religion is irresistibly driven. And, satisfying as it does the demands of the most rigorous logic, at the same time that it gives the religious sentiment the widest possible sphere of action, it is the conclusion we are bound to accept without reserve or qualification."

When from the discussion of matter and force we turn to the phenomena of life we find curiously enough as the unseen directing mind becomes more plainly revealed so is its existence denied with increasing assurance and vigour.

One way of doing this is by word conjuring, and in definitions of life, describing its phenomena; as previously "force" and the "direction of force" were hopelessly confused.

For example, speaking really of the phenomena of life, but ostensibly of life itself, Herbert Spencer says in his classic definition, "Life is an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite incoherent homogeneity to a definite coherent heterogeneity; and during which the retained motion undergoes a parallel transformation." Those trained minds who have fully mastered this sentence must confess that the word "Life" in all this polysyllabic tangle does not mean "life," but its phenomena and their results.

Again, for this point is important, the philosopher says "Life is the continual adjustment of relations in the organism to relations in the environment." Surely such a statement is misleading. It is not life that is spoken of at all, but one of its attributes or functions. Professor Huxley pushes the matter still further, and plainly asserts that life is one of the properties of protoplasm. He asks in his *Lay Sermons*, "What justification is there for the assumption of the existence in the living matter of a something which has no representation or correlation in the non-living matter which gave rise to it? If the phenomena exhibited by water are its properties, so are those presented by protoplasm, living or dead, its properties.

If the properties of water may properly be said to result from the nature and disposition of its component molecules, I can find no intelligible ground for refusing to say that the properties of protoplasm arise from the nature and disposition of its molecules. . . . We know that the phenomena of vitality are not something apart from other physical phenomena but one with them: and matter and force are the names of the one artist who fashions the living as well as the lifeless." Elsewhere Dr. Huxley says, "It is as ridiculous to speak of life apart from protoplasm as to speak of the 'aquosity' of water."

Observe where we arrive. Life is a property of a special form of matter, and matter and force are the names of the one Artist who fashioned it!

Büchner, bolder and bolder still, actually says, "The facts of physical science *prove (sic)* that all organic beings owe their existence solely to the conjoined action of natural forces and materials. Organic beings are derived by spontaneous generation by the combustion of inorganic elements."

Now the facts of physical science prove nothing of the kind, and such assertions by men of science surely tend to bring many of their so-called "facts" into discredit.

Protoplasm has long been made to do duty for a God; but what is protoplasm? Our latest scientists are beginning to see that it is not a simple substance at all, but a very complex one; and that very probably not it, but the granules it is seen to contain under a power of 4,000 diam., may be the so-called physical basis of life. In fact we are hearing less and less of protoplasm; and the granules themselves, had we power to investigate them, might turn out to be very worlds of complexity, so that dogmatic postulation on such rickety premises is to the last extent undesirable.

Unbelief and Atheism both live by faith that the origin of life will yet be accounted for, but we do not need to wait for the advent of that day to see that such statements as that "organic forms are built up by the play of molecular forces" are pernicious rubbish. Rubbish, because without meaning, and pernicious, because trifling with a great subject.

In 1885, Dr. Nicholson says, "I do not say that it may not be ultimately proved that dead and living protoplasm are one and the same substance, with no other difference than that dead protoplasm is in a statical, and living protoplasm in a dynamical condition," a statement which seems to

ignore the existence of life apart from protoplasm almost as strongly as Dr. Huxley. It is only right to say Dr. Nicholson adds that at present there is not a shadow of proof to support such a theory. Once more, then, we reach the old, old question. Are we to consider protoplasm an essentially vital substance? Is life its motion or its mover? Protoplasm is a "vital substance" only when acted upon by life; but when it is not, it is still protoplasm. Life cannot be its motion, for motion is a phenomenon, and life is not a number of phenomena, but a power that originates and directs them. The phenomena exhibited by living beings are clearly largely physical and chemical, and produced by natural laws. The question is whether the directing agent is also a force in the common sense of the word. Now Tait has shown that force cannot direct force, therefore the director of the phenomena of life must be life itself, or in other words mind, which is the only directing agent we know of, or can conceive. Life then is not protoplasm in any condition in which it may be found; neither is it any sort of force that moves it, such forces not being vital, but physical and chemical; but it is in its essence the directing power that sets them in motion, or in other words, mind; for the phenomena of life are clearly the phenomena of mind and not of matter.

In a leaf the question is, not what moves the molecules to form it (this is a force) but what guides this motion to produce a leaf. And purpose is everywhere displayed by life besides other qualities of mind. An amoeba shows volition, appetite, and passion. Sir J. William Dawson watched one trying to swallow a one-celled plant as long as its own body. It was evidently hungry, and eager to devour it, and stretched itself to its full extent, trying to envelop the plant. It failed again and again; but renewed the attempt, until at length convinced of its hopelessness, it flung itself away, and made off in search of something else.

In a lower form of life still, not even a cell, but a shapeless mass of protoplasm without wall or nucleus (the *protomyxa*), we find that whenever any particle of nutritive material comes in contact with it it has power to recognise it, and to throw out of its own mass long filaments to grasp it, and then by their contraction and withdrawal to lodge the food within its own body. This undifferentiated protoplasm, destitute of all organs and yet having life, exhibits purpose.

and may we not say, instinct—both properties of mind, and distinct from any known quality of matter.

Professor Huxley, in his *Lay Sermons*, and in spite of his materialistic views, beautifully paints the action of mind on matter, or life on protoplasm; as follows:—"Examine the recently laid egg of some common animal, such as a newt or a salamander. It is a minute spheroid, in which the best microscopes will reveal nothing but a structureless sac, enclosing a glairy fluid holding granules in suspension. But strange possibilities lie dormant in that semi-fluid globule. Let a moderate supply of warmth reach its watery cradle, and the plastic matter undergoes changes so rapid, and yet so steady and purposelike in their succession, that we can only compare them to those operated by a skilled modeller upon a formless lump of clay. As with an invisible trowel, the mass is divided and subdivided into smaller and smaller portions, until it is reduced to an aggregate of granules not too large to build withal the finest fabrics of the nascent organism. And then it is as if a delicate finger traced out the line to be occupied by the spinal column, and moulded the contour of the body; pinching up the head at one end, and the tail at the other, and fashioning flank and limb into true and salamandrian proportions in so artistic a way that after watching the process hour by hour one is almost involuntarily possessed by the notion that some more subtle aid to vision than an achromatic would show the hidden artist striving with skilful manipulation to perfect his work."

Nowhere could we find the action of mind more graphically delineated, or the hidden finger of God more beautifully described, and yet Professor Huxley neutralises all the passage by declaring that matter and force are the names of the hidden artist! To call matter and force an artist is a contradiction in terms, for matter is inert, and force is blind.

Life, as a product of natural laws or forces, is a pure assumption; and is contradicted by the fact that although often in opposition to them it yet works by their aid.

The protozoon at one end of the scale and ourselves at the other, alike show this.

A protozoon can swallow, digest, and assimilate food, using the albuminous part for its own tissue, and burning away the rest or rejecting it just as we do; all in opposition to and yet by the aid of natural laws. Like us it can only subsist on food a plant has produced. Like us food is

expended in animal force. A muscular act is as simple and unconsciously performed as sending out a pseudo-pod; and digestion is as unconscious in a stomach as if performed in a temporary vacuole.

Calcareous shells grow up from within the protozoon bodies, as do our bones; and are formed as unconsciously as the skeleton of an average Englishman. The power within this particle of jelly guides its physical and chemical force so as to give rise to the most exquisite formation and arrangement of the particles of lime.

The smallest living being is said to be $\frac{1}{254000}$ inch and yet moves with grace, eats, and multiplies. As if to exclude, moreover, the inanimate clay which we call protoplasm from any active share in the wonder that life produces, Herbert Spencer expressly shows that no germ, animal or vegetable, contains the slightest rudiment, trace, or indication of the future organism, since the microscope has shown us that the first process set up in every fertilised germ is a process of repeated spontaneous (?) fissure, ending in the production of a mass of cells not one of which exhibits any special character!

To sum up then; the inorganic part of the universe consists of matter and force, the directing and determining agent being mind—the mind of God. In the organic world we have protoplasm and life, which latter is the name we give to the determining and directing power that moulds the protoplasm by means of the forces of nature to certain definite ends. Life thus stands revealed as mind, and this mind the mind of God.

The natural we have seen is matter as formed by the hand of God (that is, by forces which are His laws) in accordance with His mind.

It is called natural because it is what is known, what is expected, what is usual, from the simple fact that His mind changes not, and that therefore forces are always determined in the same directions, giving definite shapes and properties to leaves, flowers, and fruit, to crystals, dewdrops, and planets.

If the natural be matter moulded by the mind of God, the artificial is matter moulded by the mind of man.

Clay is a natural product, that is, it is matter held together by certain natural laws, the expression of mind—the mind of God. A brick is an artificial product, that is, it is matter in a form impressed on it by the mind of man.

The moment you see a brick you see matter + mind, human mind—an artificial product. You know there is mind in it, for its shapes and proportions betray a purpose, and that purpose means mind is nowhere denied save in nature. Not all the philosophers or scientists that ever lived could persuade you that clay could shape itself and bake itself into bricks.

Walk down an old river bed, or hunt in a heap of drift. You pick up two flint stones, both chipped; one you say is a natural product, the other artificial; for in the latter you notice the chips have a purpose you can grasp, forming the stone into a rude arrow head. You are as quick as lightning to discern the faintest trace of human mind on matter; rude scratchings on bones, sherds of broken pottery, bits of battered bronze are all eloquent with what we delight to honor—the great mind of man—they are all artificial.

How we glorify this mind, and rightly enough too! We wonder at St. Paul's, and St. Peter's, at the Parthenon and the Coliseum, and honor the great minds that created them.

A watch, a steam engine, a type writer, all excite our admiration of the mind that is stamped upon the brass, steel, and iron, in such large capitals: and were anyone so idiotic as to attempt to show that such were self-made, or the result of the interaction of blind forces, or of that mysterious variety—molecular force—we should promptly put them in an asylum under the care of Her Majesty's Commissioners.

And yet all these artificial products are clearly evolved. A cathedral was not the first building—nor a watch the first timepiece made by the mind of man. Through long centuries the evolution of the watch dragged on, and indeed is still progressing, and so with every artificial product, down to the very pen that writes these words and the paper on which they are inscribed. We find no difficulty here in the union of evolution and purpose, indeed we cannot conceive the one without the other. So clear are we as to the artificial and as to any imprint of the mind of man, that to us in these matters fortuitous or spontaneous evolution is the most drivelling folly; and we are prepared to stake our reason on the statement that in all things artificial all evolution implies an evolver, or in other words a directing mind.

When, however, we consider our attitude towards the natural and the artificial the contrast is striking. The very philosopher who sees mind in the three chips of an arrow head

or the three parallel lines on a bone, sees nothing but spontaneous evolution or the action of molecular forces in the production of the savage who made them.

In short it takes a great mind to make a machine, but the mechanic is spontaneously evolved; none but a clever man can make a watch, but any one can make a watchmaker, or rather it requires no one; for he is derived from the "spontaneous combustion of inorganic elements."

All see mind in the artificial, while too many seek to deny it absolutely in the natural; and the reason is not far to seek. For it is as natural to glorify the mind of man as to seek to deny the mind of God.

Does not the extraordinary nature of such reasoning strike us? Turn it round for once, and say a watchmaker is evidently the product of matter acted on by the mind of God, but a watch is the result of the "spontaneous combustion of inorganic elements"; or an architect requires a great Designer to make him, but St. Paul's is the natural outcome of the molecular force in stone—the folly is now apparent to all. The quiet ignoring and even denial of mind in the natural so common with our scientists could not be tolerated one moment with regard to the artificial.

Surely the architect is a greater work than a cathedral, a brickmaker than a brick, and *a fortiori* if the one cannot be even conceived without involving the action of mind, how much more the other: and if we are quite clear the watchmaker is not artificial or made by the mind of man, it is clear that in saying he is natural we imply he is made by the mind of God.

The artificial is capricious as the mind that makes it. It cannot be foretold, it is not that which is to be—"natural"—because of the difference of a petty finite mind as compared with the All-wise and Infinite.

The very words used to describe the product of the two minds illustrate their difference.

But we may carry the inquiry one stage further back and ask whence came the mind of man? Is it eternal, self caused, or itself a product? It cannot be eternal, for man is only recent, nor can it be self caused. It is therefore a product. But of what? We read, "God made man in His own likeness, and breathed into his nostrils the breath of life," but I suppose even in this assemblage I must not quote Scripture as an all-sufficient answer to a scientific question. No other answer is however possible, and it is as self-evident on reflection that the

First Cause caused the mind of man, as that He caused the heavens and the earth.

We therefore come to this, that the natural is matter immediately fashioned by the mind of God; and the artificial is matter immediately fashioned by the mind of man, this itself being the product of the mind of God.

Nature therefore necessarily expresses "the glory of God and sheweth His handiwork," for it is the transcript of His mind; whereas in the artificial we generally forget the reflected glory of the One who formed the human mind, in our adoration of our own intellect and skill. All this is natural enough, but rather childish. That French critic had a keen vision who said, "God is still generally acknowledged in England, save by the street boys and the higher philosophers."

Turning to evolution there is no doubt a difficulty even if in both cases we postulate an evolver. For while we perceive that the finite mind of man cannot see at once a watch in a sundial, or a steam engine in a kettle, but has slowly to evolve the one out of the other; when we come to an infinite mind we cannot see why imperfect products should precede the perfect. But were they imperfect? We can see in the first rude engines and clocks their great inferiority to the locomotives and chronometers of to-day, but in geology and zoology we surely see equal perfection throughout all ages, each product being as truly adapted to its environment then as now: an amoeba in its way being as perfect as a man, a fungus as an oak. So that evolution in natural things is not stamped with the imperfection of a finite mind as in artificial, but is due to some other reason, which I may not now pursue. Indeed the time has not yet arrived to consider the subject impartially, for the strife of battle has hardly yet died away.

To repeat then—the natural everywhere, from a molecule of water formed by the chemical affinities of atoms to the most distant nebulae, as well as all living things, are the product of matter moulded by the mind of God, immediately; whereas the artificial is the product of matter moulded by the mind of man immediately, his mind being the product of the mind of God.

There yet remains the question of animal products—What is a bird's nest? What is a beaver's dam? What are the actions and works of animals? Are they natural or artificial? Our answer depends upon whether we recognize a mind in an animal apart from the mind of God as seen in nature.

Let us consider one or two instances of so-called instinct.

Du Bois Raymond says: "With awe and with wonder must the student of nature regard that microscopic molecule of nerve substance which is the seat of the laborious construction, orderly, loyal and dauntless soul of the ant!"

Huber says: "On the visit of an overseer ant to the works when the labourers had begun the roof too soon, he examined it and had it taken down, the wall raised to the proper height, and a new ceiling constructed with the fragments of the old one."

Romanes shows the sphex wasps provide animal food for their young which they paralyze but do not kill. Crickets have three nerve motor centres to be paralyzed; one behind the neck, which has to be stretched to get at it and two in other minute points in the body, yet all these are unerringly punctured by the wasp. He adduces this as a specimen of supposed "lapsed intelligence."

A spider with a big fly could not secure it, so bit one of its legs, and as the fly stooped its head to its leg, at once secured it with cords thrown over it.

Birds go through elaborate dramatic performances when their nests are approached, and insects often simulate death.

Some jackdaws tried to build a nest on a sloping window sill outside a church, but the sticks all slipped down, so in five days they constructed a pyramid of sticks resting on a step six feet below and reaching up to the sill to support the nest on which they built it.

These instances suffice to show that when nerve centres exist how much the actions we loosely term instinctive resemble the results of human reason. No doubt when no nerve centre whatever exists the actions are purely reflex or automatic, but close observers find it hard to believe this is so in higher animals.

Even if they possess a mind however it is only in its lower qualities. Of self-consciousness, independent will, and moral purposes there is no clear evidence; and in the absence of free will, there is of course no responsibility. We therefore call the work of animals, however clever and ingenious, as a rule, natural; thereby implying that if they have a mind it is not free to act entirely on its own initiation, but that its action can be foretold sufficiently to term its products "natural" rather than "artificial." At the same time occasionally the product appears to be so connected with reason and thought

as to be highly "artificial," particularly when it resembles human work. Once more then in the inorganic part of the universe we see matter acted on by determined force, or by the mind of God; in plant and lower animal life the same, hence the phenomena in these spheres are natural. In many of the actions of higher animal life it is not quite clear as to how far a derived intelligence with a narrow range of liberty may not be the agent, the phenomena on this level are therefore sometimes called natural and sometimes artificial; while in the surroundings of man we see matter acted on by a fully emancipated self-conscious mind, His own bodily life being still unconsciously carried on as in the lower animals; hence we term all products of will action artificial, while the physical functions are still called natural.

I am afraid I have wearied my audience with this long paper, in which after all I have succeeded in saying so little; but that little was worth saying if it has emphasised the fact that the natural world bears as truly the stamp of the mind of God as the artificial world does the mind of man; and that it is futile to deny the presence of mind in the formation of man, if we admit it in his handiwork. Inasmuch also as instinct implies purpose, and purpose mind, it is admitted equally in the work of animals; only as such work is generally uniform in each species, and can therefore be predicted, is it called natural rather than artificial.

I cannot of course expect that in my remarks I have carried all my hearers with me, but I thank them for the patient hearing they have accorded me, and trust they will deal leniently with any errors they may detect, both on account of the difficulty of the subject and the very busy life of the speaker, which has not allowed him the time that such weighty questions require.

The CHAIRMAN (REV. CANON GIRDLESTONE, M.A.)—I am sure you will allow me to thank Dr. Schofield in all your names for the very interesting paper which he has given us.

Dr. GERARD SMITH, M.R.C.S.E.—Upon the main thesis of Dr. Schofield's paper I have no remark to make except to express my appreciation of the value of what he has said; but the major portion of the paper is a preamble leading up to the main thesis, and in that he dealt more or less with the great theories held by materialists which are supposed to be so essentially tangible as against those held by members of this Society, which are regarded as so very intangible. But I notice that Dr. Schofield has quoted, as far as he could possibly quote, those arguments on the materialistic line of thought, commencing only with vortex motion. I claim that we should be allowed the fullest right of search, which should go far behind this, and that when we come to vortex motion we have skipped over a great deal that should have gone before, and which we must go into if the theories are to be consistently held. In following out the materialistic argument everyone rightly suggests a series of infinite causes, one behind the other, and I hold that the consistent following out of what used to be called the atomic theory brings us precisely to this position. It is very difficult to get a materialist to go with you, and not to fly off at some point when things are getting a little difficult. I have asked questions as regards whence comes energy (not force) residing in original atoms; and have been told, constantly, that it is the result of their inherent properties, and I have asked whence come their inherent properties and have been told "that they are the result of the inherent energy"! That is cause behind cause, and we cannot get behind that when we go in that direction. Now the simple monistic assumption is said to be given up—the one idea of starting from equi-distant atoms all spread equally in space—but it is not given up if we still follow Spencer's polysyllabic expression that "matter passes from an indefinite incoherent homogeneity to a definite coherent heterogeneity," passes, that is from a state of equal separation of atoms in space, to unequal sized masses. We will not go behind that; but I ask, are these atoms at rest or moving? They must be one of the two. If they are at rest, I want to get at where the vortex motion comes in? If not at rest, whence came the primary movement? The answer is "Gravity—every atom as a centre of gravity and therefore the atoms would come

together of themselves." When you come to think of it, the only thing that gravity would do, under those circumstances, would be to keep everything at absolute rest eternally. It is the *reductio ad absurdum* behind which one cannot get. If you will permit me I will follow that out a little further. If they are moving, where are they moving—round, up or down, or right or left, in space? Gravity cannot get to action until some larger mass is formed—until the "definite coherent heterogeneity" has been formed. For gravity cannot be the cause of its own antecedent conditions. Besides which I might remark if these atoms are moving, they are moving in parallels and they would never go out of the parallel, and gravity would not account for that. Now I will just say this also—that there is another resource and that is that the atoms are free-will atoms. Since you and I are only made of organic matter, and since it is certain that you and I have got free will and go here and there and do what we wish; therefore it is only fair for the materialist to say that the atoms of which the body is composed are free-will atoms. Professor Clifford said that "every atom has a piece of mind stuff in it"!—another *reductio ad absurdum* I would ask you to take notice of.

Finally, I would like to state that which I think is held by most members of the Society—that the "I know" of science leads us into so many unthinkable notions that I think we may say the "I believe" of religion satisfies the reason in a far more satisfactory and perfect way.

Professor E. HULL, LL.D., F.R.S.—I would refer to one point that Dr. Gerard Smith has mentioned, and that is with regard to gravitation. Gravitation is a force; but the effect of gravitation by itself would, I think, go even further than he stated. It seems to me that if matter had been universally disseminated in that manner, and the force of attraction had been universally present with each particle of matter, the result of that would have been to produce one single solid mass of immovable matter in the centre of the universe. You require something more than the force of gravitation, you require motion, which, in the solar system is opposed to gravitation, *i.e.*, a centrifugal motion, acting in conjunction with gravitation, in order to keep the whole system in its normal and natural condition. But gravitation, by itself, would have had the effect of causing every particle to draw every other particle to itself, and thus form a centre round which all

these particles would collect, producing one solid motionless mass in the centre of the universe. I have listened to this paper with great interest and satisfaction.

The CHAIRMAN.—There are two or three points in the paper to which I desire to call attention. On the second page there is a sentence which I think is of great importance:—"Human reason is surely degraded by declaring the existence of God, or creation by Divine power to be unthinkable." That is a point which you will remember the late Charles Bradlaugh often used to call attention to. He used to say, "I will not believe what I cannot conceive—I cannot conceive God; therefore I will not believe in Him." At first sight this seems very simple, but suppose we put it thus: "I cannot conceive the nature of God; but I can conceive that there is a Being which we may rightly call God," then we see the matter is quite different. It means "I conceive that a Being exists whose nature I cannot fully comprehend," and this at once saves you from the difficulty that he was in the habit of propounding. There are many things that exist that I cannot fully understand, but I would not say they did not exist because I do not understand them. I would rather say, "I am certain that they exist, for I cannot get on without them; but why these exist, or how they exist, is quite another matter." So we may say "I conceive there is a God, but I cannot conceive the full nature of God." That distinction will help us, perhaps, in considering that subject.

I note that the author defines "artificial" as a product of the mind of man, and "natural" as constituting the attributes of the Divine mind itself.

Then on page 188 you have a case of an artificial product such as a brick which is matter plus mind, evidently, and the question rises whether the human heart, for instance, is matter plus mind. Cases are given of a watch, a steam engine, and a type-writer. Take the case of a type-writer, or of some automatic machine, which I would prefer even to a type-writer, because in the case of a type-writer a man's hand is manifestly used—but take an automatic machine in the ordinary sense. Remember what it is—it is simply compressed mind; and in providing yourself with a piece of chocolate out of an automatic machine you do not annihilate mind. So with God—you do not annihilate God by saying a tree brings forth beautiful fruit. "A telescope is a

wonderful thing, but the mind that constructs it is far more wonderful"; and I think we may say the same of the series of things which we call Nature. But I suppose the great difficulty which is felt by the materialist lies here—I refer to page 189, about the middle paragraph where St. Paul's is spoken of;—we have no doubt that St. Paul's is constructed by human beings, because we are in the habit of seeing human beings make buildings. If no human being had ever been seen to make a building, construction would be a very different thing to us, and we might think it the work of nature; but you see here, we appeal to the eye. We have seen the thing done and therefore we know it is done by man.

Now God is invisible, and at every stage of this discussion we realize that the invisibility of God is one of the great difficulties—a difficulty which any of our working men in East London would take hold of at once and say, "If I could only see God I should believe at once—seeing is believing." They do not realize that the highest position of man is to lift himself up above the senses—to draw inferences from that which is above and beyond the senses.

Another thing which I think should be borne in mind is this—that nature is constant, and the more constant it is the more we take it as a matter of course, and the less we expect to find a reason for it. The sun rises, we say, every day, and so we cease to philosophise about it and its properties which give to us light, heat and force. But how different to remember that this is the work of a Being whose mercies are renewed every morning is this training of the human mind which is such a help, and it seems to me that the materialistic view tends to reduce the mind of the believer in it to a minimum and to an animal condition instead of training him up to see the things which are invisible and which are the secret of all human life.

The AUTHOR.—With regard to the Chairman's remark referring to the difficulty some profess in believing in God, because they have never seen Him work. "We have seen buildings erected." he says, "and therefore we know that a building like St. Paul's is the outcome of man's constructive power"; but to my mind the force of this argument goes the other way. If we had never seen a carpenter making these tables, for instance, we should be logical in saying, "These are the natural outcome of wood, as man

is of protoplasm," and in denying the action of mind in both cases. But it seems to me, when we have an actual exhibition of mind in the one case of making a table, our denying it in the greater work of making a body is absolutely unreasonable. What I complain of is this—that those who are so ready to acknowledge the ingenuity of the human mind, and to see the artificial where it is difficult for the ordinary observer to see anything but the natural, such as in the three chips in a flint arrow's head—these very men who are so keen to see mind in the direction of a chip are those who are most persistent in denying it in the creation of the man who made the chip, and there I think there is no possibility of excuse. I do not know whether I carry the audience with me, but it is impossible for me, from my particular point of view, to understand such an acceptance of mind in the production of the artificial, and such a denial of it in what I call the natural, unless there be behind it a bias that leads a mind, otherwise keen and acute, to deny those things which seem so plain to others; but I fear that there is that bias, unconsciously acting, in men who deny mind in the one case and accept it in the other.

I thank you for the very kind way in which you have listened to me.

The Meeting was then adjourned.

COMMUNICATIONS RECEIVED ON THE FOREGOING PAPER.

Professor LIONEL S. BEALE, M.B., F.R.S., writes:—

I venture to think that already we possess incontrovertible evidence in favour of the view that *living* and *non-living* are entirely distinct and incomparable—that the living state is *absolutely* separated from every other known state for condition of matter—that between the two conditions there is no gradual transition—that the difference is not of degree only, as has been unreasonably affirmed—and that although living and non-living matter may be in contact, in no case does the matter alive shade

into or gradually pass into that which is not in the living state, or which may have just ceased to live. Hence I think it justifiable to give a definite name to the matter which is in the temporary *living state*, and the word *bioplasm* seems to apply. To talk of *living protoplasm* and *dead or lifeless protoplasm* can scarcely be helpful, for by so doing we assume that protoplasm may cease to live and still be protoplasm, that in fact we may have protoplasm in two states—living and dead protoplasm. To speak of living and non-living or dead *bioplasm* would be contradictory, for when bioplasm ceases to live, we have no longer bioplasm, but *only lifeless substances which result at the death of bioplasm*, in fact non-living compounds formed when bioplasm ceases to live. These may differ much in composition and properties according to the conditions under which the death of the bioplasm or living matter occurs, and the substances thus formed cannot live again, unless they are taken up and appropriated by matter already living.

During the living state of the matter its ordinary properties are suspended—the affinities of its constituent elements cease to operate for the time—while they are moved, and rearranged and made to take new positions with respect to one another. To subject matter in the living state to chemical analysis is impossible, because in the attempt to do so, the living matter is killed, and we have no longer the actual living matter to deal with, but only the substances formed at its death. Matter weighs exactly the same in its living and dead state. It must, I think, be admitted that life or living power is not due to the matter itself, or to its properties, or to the properties of any substances which can be obtained from it.

As is well known, of the many elements discovered, those which contribute to the matter alone capable of living, are but very few, and these same elements have been, are, and there is reason to think will continue to be the essential constituents of every living organism belonging to this world—whether the living organism or organisms, of the first beginning, or the very last that may survive without leaving descendants.

Life then is not a property of mere matter, but a power or

agency of a kind with which nothing can compare. It orders, directs, enforces, compels. Gravitation, attraction, affinity, yield for the time to its sway. It seems to directly influence the matter itself, not to act upon it from a distance however slight. Elements seem to be separated, rearranged, and grouped in a manner inexplicable and effected by no other means known. It works according to definite plan, according to design predetermined and repeated over enormous periods of time, and without impairment. Organs, structures, actions of which there is at first no evidence seem to be anticipated and prepared for, it may be years before their actual formation or occurrence. Vital power seems to be transferred from particle to particle, sometimes without modification during vast periods of time; sometimes on the other hand leading to the production of new forms that never existed before.

To attribute all the marvellous and unceasing vital activities to the passive properties of material particles seems most unreasonable, for is not obviously the *power* which influencing the same *material particles* for a very short time, soon subjects new ones to its influence, being in fact transferred from one set of particles to another, that is the real cause? This activity, this vital directive agency, without loss, change, or conversion into anything else may spread and increase for ages, or be made to cease for ever at any moment of its progress. The evidences of its action may be patent for æons after the period of its active operation and extinction, and the very organisms depicted from the study of their imperishable remains—or on the other hand not a vestige of the operation of vital power may be demonstrable, a very short time after enormous amounts of matter have been caused to live.

For all these wonderful vital phenomena, the matter actually concerned in the early changes of the living being, may be so minute as not to be discernible with the aid of the highest magnifying power at our disposal, and its weight may be hundreds of times less than a particle just sufficient to affect the most delicate balance. But such invisible structureless, colourless particle may be the repository and carrier of vital power that may be transferred to tons of matter within a very short period of time, and an

immense area be thus peopled with new and lasting or transitory and evanescent living forms.

Dr. D. BIDDLE, M.R.C.S., writes:—

This paper, a proof of which I have had the privilege of reading, is one of the most powerful aids to Faith that I have met with, and comes as a great refreshment after a perusal of Professor Bradley's highly metaphysical work, "*Appearance and Reality*," touching as it does on many of the same questions. It may be impossible to deny that "reality is sentient experience," but it is equally impossible to deny that whole worlds of possible experience lie beyond the actual experience of any individual. Moreover, the experience of the individual convinces him that in some part of it he is active and in the rest passive, that events are rarely determined by himself, but follow a law in the laying down of which he had no part.

I quite endorse Dr. Schofield's assertion that although evolution in art is marked by imperfection in the earlier stages and indeed throughout, such is not the case in the earlier products evolved by the Creator. But I fail to see that protoplasmic "life" involves intelligence which is lacking in inorganic nature. In the human being there are many processes of life which are uncontrolled by his intellect, and yet work according to laws as fixed as those of gravitation and the like, although we regard them as of a higher kind. So-called "natural selection" is never capricious but strictly governed by laws.

Professor H. WEBSTER PARKER, LL.D., New York, writes, suggesting that in discussing the subject the use of the term animal in contradistinction to human would have made the author's argument clearer.

Professor Parker's remarks are of unusual length; it is hoped that they may shortly form a basis for a paper.