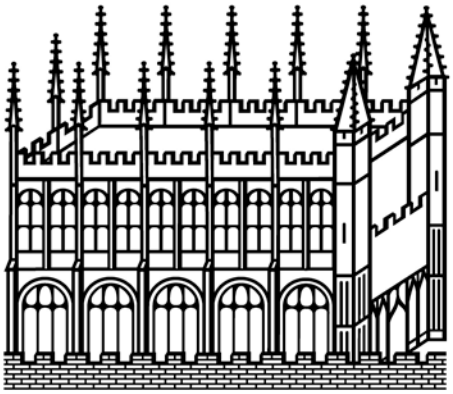

ALPHA;

OR,

GOD IN MATTER.

BEING

A Scientific Résumé of the Known Nature of Force and Existence;

AND

A still further Enquiry into the more Occult Phases of both.

BY

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MANCHESTER:

TUBBS & BROOK, 11, MARKET STREET.

LONDON:

SIMPKIN, MARSHALL, & CO., STATIONERS' HALL COURT.

MANCHESTER:
PRINTED BY TUBBS AND BROOK,
11, MARKET STREET.

NOTE.

THE Author wishes to observe—and it is the only "preface" that he deems necessary—

1st. That the overthrow of the arguments of the Infidel was not only a labour of love, but served as a convenient scaffolding for building in the scattered elements of the structure.

2nd. That the attempt to name the works by which many of the reasonings are fortified, was ultimately given up in despair.

The paper is a compilation from a vast number of notes — extending over many years—weeded out, revised up to the present time, and welded together as an epitome of subjects interesting, not only to scientific men, but to thoughtful men generally.

The objects which the author has most studiously kept in view throughout are :— (1) to put the conclusions at which he has arrived in the simplest language ; (2) to concentrate his observations to suit the abridged time of his readers ; (3) to make them think,

by striving to give them food for thought; and (4) to keep as far as possible to sound bases or fairly deduced facts.

With such aims, upon so wide a range of abstruse and disputed questions, some little allowance may be justly asked for the book as a whole.

Rests or pauses are made on pages 24, 48, 77, 105, 132, 161, 166, and 193, which may take the place of chapters, and a copious Index has been appended. The form of dialogue was adopted after the maturest consideration.

The discussion of the different phases of Christian faith has been designedly reserved; this volume deals only with Matter and its Emanations.

ERRATA.

Page 72.—11th line from top, for "Sodium," *read* "Iodine."

,, 73.— 5th line from bottom, for ×, *put* +, and after "water," *insert* =.

,, 164.—10th line from top, for "on," *read* "in."

ALPHA;

OR,

GOD IN MATTER.

Enquiry. I want you to assist me in my enquiries into some of the great mysteries of creation, and to impart to me such knowledge as will serve to guide me, not only therein, but, it may be, in spiritual things also.

Reply. I will do so most willingly, if you are really in earnest.

E. I am, sincerely, I assure you; and the first great question I have to ask is, Is there, do you believe, a God?

R. I do; the Creator of the universe and the Maker of all things.

E. And what is His nature?

R. He is a Spirit, and is eternal and unchangeable; having neither beginning nor

ending. He is omnipresent, omnipotent, or *all*-powerful, and omniscient or *all*-wise.

E. And what is God's relation to *this* world which He has created?

R. He is always present, directing, guiding, controlling, and arranging all things by His providence, as *He* wills; His eyes are over all His works.

E. What would be the result if it were not so?

R. There could, of course, be no *special* providences; and having wound the world up to go like a watch, as it were, there could be no further interference until it had run down; because any such interference, it is manifest, would spoil the working of the whole.

E. And how would this affect His creatures?

R. No appeals to Him for assistance in time of need could be granted, prayer must remain unanswered, and all our actions be determined by the most rigorous law.

E. And whence do you get this view of God?

R. From His Revelation to man—the Bible.

E. Then don't you think we could arrive at

any true knowledge of God, of His dealings with men, or of the future, apart from this?

R. I think I shall be able to give you reasonable proof that we cannot.

E. But all men do not believe in this Biblical view of God?

R. There are three classes of men who do not; Deists, Pantheists, and Atheists.

E. What is the difference between them?

R. The Deists devise a God of their own —some personal, others impersonal—every one to his liking. Disbelieving also in the Revelation, the Pantheists make a God of Matter, asserting that it progresses and develops by certain unerring laws, inherent to itself; and the Atheists (if there are any), pretend to believe in neither, attributing all things to chance. Since, however, all three deny Revelation, ignore Faith, and refuse to recognize God's watchful and providential care over His creatures, I shall treat and speak of them in this discussion under one term, viz., as *Infidels.*

E. Now, in inquiring into the attributes of God, we must begin with Him, of course, as the Creator. Tell me, then, first of all, what Scripture says about the origin of our Earth?

R. It says simply, that God created it by His word and by His almighty power; though it says nothing about the *origin* of the Matter, or the substances of which it is composed. It commences the description of the Earth as a globe covered with water, the rocks being concealed within, and as being devoid of life of any kind. St. Paul goes somewhat further than this, and declares that, by *Faith alone*, we can understand that "the worlds were 'framed' by the word of God, so that things which *are* seen, were not made of the things which *do appear*"; and St. Peter, 2 Epistle, 3 chapter, 5—13, alludes not only to the past but to the future. It may also be observed that God is at one time spoken of as a "Maker," and at others as a "Creator."

E. Now does Science tell us anything upon this point?

R. Yes; I shall have to go into this question more fully by-and-by, but I may say now, that there is undoubted proof that the world in its infancy must have been in a state of the most violent incandescence, when the very hardest rocks, and metals even, were fused. As it cooled—and this cooling process is still going slowly on, so slowly that it

is doubtful if the present crust is above 30 or 40 miles thick—a thin pellicle of crystalline, granitic, or igneous rock, would coat over its surface, becoming thicker and thicker as ages on ages rolled on. The dense clouds of vapour and steam produced by this intense heat, would as gradually condense into a fluid form upon the surface, covering, deeply and *evenly*, this rocky pellicle, and leaving the atmosphere ultimately clear. How many myriads of years all this may have taken, no human intellect can decipher. It is important to notice, that any one floating over this boundless expanse of water, would perceive the Sun, Moon, and stars for the first time when this condensation had occurred.

E. Then the Earth was, as I understand it, neither more nor less than a gigantic globe-cell?

R. Yes; and your comparison is most apt; for there is a very fascinating analogy in connection with this condition.

E. What is that?

R. This; and I want you to pay particular attention to it, as by it you will obtain the key to the origin and continuation of all organized structure. If you regard the fiery

centre as the nucleolus, the rocky crust as the nucleus, the watery sheet as the cell-wall, and the surrounding atmosphere as the moveable cilia, you have the exact fac-simile of the foundation of all organization, and of the original germ-cell of every man, animal, and vegetable in creation, before it is stirred with that impulse or influence, which, we say, sets "growth" in motion, or which gives it "life."

E. How intensely interesting! Then you think this period corresponds with its first condition mentioned in the Bible, or when its real life-history began?

R. Yes. It was when thick darkness covered the deep, from the dense steaming masses of vapour I have spoken of intercepting the Sun's rays, and when the Earth was winging its majestic and silent flight through space, that the first stage of its history commenced, and a more intimate connection between it and God took place. For lo! seized in his almighty grasp, the great globe-cell began to grow.

E. How was that?

R. The rocks slowly protruded above the waters, dry land appeared, and the first dawnings of the rudest forms of vegetable

and animal life commenced. And see how beautifully Revelation speaks of this era: "When I made the clouds the garment thereof, and thick darkness a swaddling band." "Thou coveredst it with the deep as with a garment, the waters stood above the mountains. At Thy rebuke they fled, at the voice of Thy thunders they hasted away. Thou hast set a bound that they may not pass over, that they turn not again to cover the earth; for Thou sayest, Hitherto shalt thou come and no further, and here shall thy proud waves be stayed." These sentences are a synopsis of the Earth's growth.

E. Put this point, pray, as clearly as you can.

R. I will. The Bible tells us what Science can not; that, over this dead and solemn waste, the Spirit of God brooded. "The Spirit of God *moved* upon the face of the waters;" (and what "motion" is to Matter, philosophers alone can understand). God's closer union with Matter had generated *Life*. The impulse had been given which should set the atoms of inanimate Matter in motion to assume new forms; and which Motion or Force, advancing as Matter itself ad-

vanced, from the simplest to the most subtile affinities, should progress, in like ratio, into equally subtile developments. Matter and Motion, then, is the first postulate we must begin with in our investigations. Here, we may fairly say, commenced the future history of the globe-life. It must have been azoic or lifeless before, from the simple fact that no life can resist *fire;* and it *may* have been at this time that the central solid part was endowed with those properties which now characterise it, viz.: Light, Electricity, Galvanism, Magnetism, and Chemical Attraction —which are all correlative with Heat, and which may be the source of all. They are the *inner* life of this Matter, as Earthquakes, Volcanoes, and Hurricanes, with their modifications, are the *outer.* These imponderable agents may be said to be its *soul*, as the ponderable elements may be said to be its *body.* The same Spirit piercing and bending Air, Earth, and Water to its will, next evolves, from all combined, that simple germ-cell which is the commencement of all animated existence. Is it from this cause that the Nicene Creed speaks of the Holy Ghost as the Spirit of Life?

E. And what is the Biblical future to be?

R. At the end of the present era or dispensation, the crust of the Earth is to break up once again, the unextinguished fires are to burst their bonds, inflammable gases are to separate from their compounds — thus, oxygen, the great source of fire and life, must leave its compounds, hydrogen in the water, and nitrogen in the air—floods of fiery oils may well up from their mineral caverns, and the world, as we now see it, will be destroyed. Out of the chaos is to arise a new heaven and a new earth, which will be the home of the redeemed ones gifted with divine bliss and wisdom, and in which home, righteousness alone shall dwell for ever.

E. This, then, is the Revelation account as *you* understand it. Now tell me how the Deists explain creation.

R. They believe that God, in the commencement, endowed Matter with certain self-acting laws, which should continue without any further supervision on His part, and certainly without any further interference. Whether God was or was not united to this Matter, or whether it was—as the Pantheists now think—the only God, gave rise to endless discussions even among the ancient philosophers. Plato believed that God, of His

own will, united Himself with it, but did not create it; so that, although the Matter was from eternity, it was quite proper to say that the world was *created.*

E. And what is the belief of the Pantheists?

R. They make virtually—however they may pretend to deny it—a God of Matter itself; for they affirm that our God, as a providential Being, does not exist. They say that the dry land appeared, simply because the propulsive forces within — commencing to act as the heat diminished — bulged, or thrust, or pushed it out above the waters; that animal and vegetable life arose from a peculiar arrangement of atoms, and that the laws of development and adaptation residing in Matter, are inherent to it and self-endowed. Hume's proposition is as follows:—"For aught we know, Matter may contain the source or spring of order originally within itself, as Mind does; and there is no more difficulty in conceiving that the several elements, from an internal unknown cause, may fall into the most exquisite arrangement, than to conceive that their ideas in the great Universal Mind, from a like internal cause, fall into that ar-

rangement." "By supposing it—the world—to contain the principle of order within itself, we really assert it to be God; and the sooner we arrive at that Divine Being, so much the better." Dr. Chalmers states the atheistical argument thus: "How do we know that the world is a consequent at all? Is there any greater absurdity in supposing it to have existed as it now is, at any specified point of time throughout the millions of ages that are passed, than that it should so exist at this moment?" Spinoza, the reviver of the τὸ πᾶν theory, Pantheism, affirms that there exists but *one substance*, Matter, which has two attributes, *infinite expansion* or modification, and *infinite intelligence*. It seems singular that unbelief drives men back to arguments thousands of years old.

E. Then there is really very little difference between the Deists and the Pantheists?

R. No. As far as their reasonings on the origin and progress of the world are concerned, we may consider them the same.

E. And how do they account for the world then?

R. They generally adopt La Place's theory. They say that Matter was once diffused throughout Space as infinitely minute

particles; that when these particles or atoms began to concentrate by attraction, they commenced to whirl or revolve from the centre outwards, from west to east.

E. What proof do they give of the existence of this Matter in Space?

R. They say that in different parts of the heavens, the cloudy or nebulous appearances caused by its diffusion may be seen by the telescope, and that this world-forming is known to be still going on.

E. Now is it necessary to see or feel these atoms?

R. No; upon this point there is a great tendency to error. Writers often reason as if the particles of Matter might be perceived by the senses, aided or unaided. There is no ground whatever for any such idea; they are absolutely invisible. For instance, common coal-gas is Matter in a diffused state, but we have no means of detecting its particles either by sight or feeling. We know that they do exist in it, because we can smell and burn them. In water or fluids these particles are closer, so that they "wet" or adhere to the hand if immersed in them. In a solid they are more compressed still, but you cannot imagine Matter so solid as

not to be porous; that is, that all its atoms should touch by all their surfaces; there are "pores" or infinitely minute spaces between them.

E. And what, may we suppose, fills these spaces?

R. Heat and its correlatives; for, by still further compressing the body, as by hammering, we can drive them out from their lurking places, and make them show themselves. The newest theory says, that "it is the mechanical force exerted in compressing the body, which throws the particles into that (vibratory) motion which we call heat." (Hunt.)

E. But what puzzles me is, Where did this Matter come from to begin with?

R. And well it may puzzle you! It has puzzled others before you, and will again. The Infidels cut the Gordian knot on an excellent plan: they assume that it was always there.

E. That seems strange. But if Space was full of these atoms, however small, there must have been a time when this Gravitation commenced? That I think we may establish as another postulate.

R. Certainly; and you must observe that

the attraction of Gravitation is different to any of the other properties of Matter. It is a power altogether independent of Heat and its correlatives. We could understand, on Plato's view, that God, when He first united Himself with this Matter—and especially if its correlative forces were inherent to it—might have endowed it with Gravitation, which would induce motion.

E. That is clear enough; but how do the Infidels account for this new power?

R. All they can say is, that it was an inherent property in the particles of Matter to be attracted or to *gravitate* towards a common centre.

E. I do not see that, at all events. Put it this way: Space is full of atoms; they are at rest; there is neither attraction or repulsion; they begin to be drawn to a centre throughout some circumscribed space; and when once they begin to gravitate or coalesce, we can readily fancy they begin to whirl as in a vortex; but they must state plainly, if I am to believe them, where this new agency or power, Gravitation, comes from; I must pin them down to this point.

R. Then I can only say they cannot tell you.

E. That is awkward. Well, when these particles *have* begun to whirl, what then ?

R. Then we get on to surer ground; for as the concentration increases, so does the rapidity of the whirling motion, and as the closer contact drives off the latent heat—which we may suppose separated the molecules from each other—this becomes manifest as flame. The new theory would of course say that the violent mechanical pressure produced that motion which we denominate heat.

E. That is a picture easily imagined; and what then ?

R. Ultimately the centrifugal force becomes so tremendous that even the attraction of Gravitation is overcome, and parts of the parent mass fly off into Space, settling themselves in their orbits after ages of rollings and swayings, when the two forces exactly balanced each other. These are the two laws, so grand and yet so simple, which exemplify alike the motion of the pebble which the boy whirls round his head, and of every gigantic orb which we see around us.

E. And what becomes of those portions which so fly off ?

R. The same process continues with them,

but in a more limited degree. Thus, if you take the Sun as the centre, the portions first cast off would form the planets which revolve around it, and on their axes; and, as they consolidated, other secondary portions would be whirled off from them, forming moons and rings; until cohesion overbalanced the centrifugal tendency, and they would slowly swing into their regular course as we see them now.

E. But although you may deny the starting point of the Infidels, do you not think this may have been the way in which God has acted?

R. I do; because we find the globe flattened at the poles and bulging at the equator, just as would be the case in a soft spherical body revolving rapidly on its axis; and I may here point out that it is the plausibility of the atheistical arguments—the dexterously blending of truth and error—which is so dangerous.

E. Is there any other idea?

R. Yes; the force required to propel bodies, such as the planets, from the Sun to their respective distances, is so tremendous, that some imagine each planet may have resulted from a separate aggregation of atoms.

E. How very wonderful it all seems! But how do we know that these worlds may not be made of very different materials?

R. The spectrum-analysis is said to prove that the Sun, and it may be other stars even, contain many of the metals of which this Earth is composed.

E. Is there any ground for believing, then, that any of these worlds are inhabited?

R. I have always longed to believe that every primary star in the heavens might be, with beings of some kind. We can only of course speak positively of the capacity of the planets, and these certainly may be readily enough. They have atmospheres, days and nights, seasons and years—we can, for instance, easily see the seas, the continents, and the polar mountains in Mars. In some of them, however, the inhabitants must be very differently constituted to ourselves.

E. Why so?

R. Because some of these bodies are nearer to, and some are vastly more removed from, the Sun; some are heavier, and some are lighter. Mercury is so dense as to seem almost metallic, Saturn is so light that it would swim in water like pine-wood, and on

the largest planetoid we should spring a hundred yards at a bound. Mercury is said to have a density of 9, Venus, Earth, and Mars, 5·5—about that of ironstone—Jupiter, Saturn, Uranus, and Neptune, have an average density of 1. Upon all the first group, water would be many times lighter than on the Earth, and the creatures themselves of the most ethereal character;[1] while the days and nights are 10 hours, instead of 24. The years of the first group are, respectively, 88, 225, 365¼, and 687 *days;* of the second group, 12, 30, 84, and 164½ *years.* Now a modification of the eye for light, and of the atmosphere to allow retention or radiation of solar rays, would make all the difference, so far as nearness to, or distance from, the Sun is concerned.

E. Can you prove this?

R. We see the first demonstrated in the different adaptations of the eyes of the owl and the eagle, and the second in the case

[1] That is, if the density of this group increases towards the centre as the Earth's is believed to do. If so, it has been calculated that water on the surface of these planets would be three times lighter than sulphuric ether, in which a cork could scarcely swim. If, on the other hand, the density is uniform throughout, man might exist in any of these large worlds without any great inconvenience.

of the Moon, which has no atmosphere at all; the consequence of which is, that that part of the Moon on which the Sun's rays fall, has a terrific heat—so great, indeed, as to affect our instruments, though 240,000 miles away—while the shaded parts have a cold correspondingly intense.

E. What a magnificent conception the whole solar system is!

R. Yes; but what is it compared to those around it? It is true that while the Earth is 91½, Neptune is 3,000 millions of miles from the Sun; and yet the nearest star beyond —and that not in our hemisphere—is 20 billions, or 20 millions of millions of miles! Thus, travelling with light, at the rate of 192,000 miles a second, or 12 millions of miles a minute, in five minutes we should cross the orbit of Mars, in half an hour Jupiter's, in an hour and a half Saturn's, in two hours and a half that of Uranus, and in four hours that of Neptune—the confines of the solar system; but from this resting-place we must travel at the same rate, for three years and a half, before we come to the first "fixed" star! While, as to size, there are worlds, not only of all colours—as a red and a blue one revolving round a third—but

hundreds and thousands of times the size of our Sun!

E. Then there are really other solar systems besides ours?

R. All the bodies in the universe seem to be moving in circles; the Moon round the Earth, the Earth round the Sun, the Sun round some other sun. But the same theory of formation, they believe, would apply to all.

E. And what, pray, is to be the end of it all, according to the Infidel view?

R. That Matter, being eternal, will go on growing, forming, and reforming, without limit; and that as one race of creatures, say Man, disappears, he will merge into the great pantheistic mass, to be remoulded into higher and nobler forms.

E. That seems a miserable assumption, I must confess. What then becomes of Man's future identity, is it lost or retained?

R. Upon this point all atheistical writers are very hazy; there is scarcely any unity whatever among them. There is a great deal of raving about the eternal purposes of Nature, and the ever-expanding progress of Matter.

E. Yes, but this is most important, because we now come to future rewards and

punishments ; and, according to this view, a good man is no better off than a bad ; for good Matter, and evil Matter, seem all one. Besides, what is the use of striving to be virtuous, if all are to go unto one place ? Moreover, it seems to me, they are in the same difficulty as to the nature and origin of Evil as believers. But I must ask you, if they *have* two sources or forms of Matter on their theory ?

R. Logically, there is no answer to your question, however they try to confuse it ; and sentences, clothed thick with mystification, are all *I* could ever get out of their works. You will find as good a summary as any, of Kant's, Spinoza's, and Fichte's views, in Oken's "Physio-Philosophy;" and if you can understand the meaning, it is more than many clever men can say who have examined them. As some examples of these extraordinary ideas, I will give you the following : —"There is no other Science than that which treats of Nothing." "The Eternal," they say, "is the Nothing of Nature." "There exists nothing but Nothing ; nothing but the Eternal." "Man is God wholly manifested, Man is the whole arithmetic." "Theology is arithmetic personified." "God

is a rotating globe; the world is God rotating." "The liver is the soul in a state of sleep; the brain is the soul active and waking." I think you will agree with me, that we don't gain much by leaving the safe tracks of our fathers, and wandering into such wildernesses of words as these.

E. I do, fully; but is there any scientific suggestion to be made, from what is known of the constitution of the Sun and the planetary system, as to what may be the end—I mean so far as the Earth is concerned?

R. Yes; time modified La Place's view of the Sun being a burning body; but the probability of it is again revived by the spectrum-analysis theory, which I cannot think is sufficiently established. The question is surrounded with the very greatest difficulties, whichever view we take. Now some believe that the Sun has a broken surface of mountain and dale, much as the Earth has. It appears to be composed of some very light material, over whose surface an immense sheet of flame rages, roaring, I am afraid to say how many scores and hundreds of miles high, and giving light and heat to the surrounding planets, which, conjointly, only form $\frac{1}{500}$ (some say only $\frac{1}{800}$) of its bulk. Sometimes

these flames leave large bare patches, which we can see as vast black caverns, some of them 40,000 and even 60,000 miles long, and from 6 to 10,000 miles wide. Now whether these flames are really fed by some generation of Electricity, or by the actual combustion of the solid or liquid substance (whichever it may turn out to be) of the Sun itself, we may not as yet be able positively to say; but we do know that it had a commencement, and so may presume it will have an end. We may picture also, what would happen if its fires once ceased, as the Earth's have done.

E. What?

R. As the parent died, so to speak, must its children the planets. These might then go on revolving as at present, but all in one dark, still death; or, the gravitating power of the Sun being changed, and overcoming their centrifugal force, they might be loosened in their orbits, and swinging spirally round, nearer and nearer—like vessels in a whirlpool—with an ever-increasing speed, would at last crash into the Sun's mass. Matter might then re-ferment, rearrange itself, and re-incubate new forms, and new creatures, as it is affirmed it has done in times past, in illimitable progression. Even in the *Edin-*

burgh Review of this year, it is positively stated that, "all planetary Matter is inevitably gravitating towards the Sun, which will be the common bourne of our system." If you *can* imagine the terrible condition of the inhabitants of the Earth, as it drew nearer, day by day, and month by month, to its frightful doom, you will not only have a picture more horribly fascinating than any distorted fancy has ever painted, but you will read and study St. Peter's account of its end with greater interest and respect than ever you did before.

E. But what reasons can you suggest for believing that the Sun might be inhabited?

R. There is certainly an atmosphere of great depth between the flames (photosphere) and the Sun's surface; and which might be so constituted, if the light and heat *are* electrical, as to be a bad conductor of this heat and light, so that both would be greatly modified before they reached the surface.

E. But it is not possible for it to be inhabited if it is a burning, and especially if a liquid mass?

R. Certainly not. And it is now stated

on the evidence of the spectrum-analysis, that the Sun's atmosphere "contains the metals in the condition of *glowing gases*, the *white light* (about which there has been a good deal of dispute) proceeding from the solid or liquid strongly-heated mass of the Sun which lies in the interior." (Roscoe.) It is further stated, that the Sun contains Iron, Sodium, Calcium, Chromium, Nickel, Barium, Copper, and Zinc. Hydrogen is also known to exist in it. The star Aldebaran is said to contain nine elements, and Sirius three. Thus you see there are two directly opposite theories. Of course, if the spectrum one should be confirmed, then the Sun and all the stars must be devoid of life (difficult to realize), or, at all events, of such life as we understand. That God should have created this and other atoms of planets for habitation, and these immense orbs only to be masses of fire, seems a very strange reflection; and it is equally strange to think that they are all only in the primary or incandescent stage of their existence. As the specific gravity of the Sun is only 1, the non-metallic substance, one thinks, must be very light indeed. As God creates nothing in vain, the only other suggestion is, that each sun or star we

see, must have its accompanying series of inhabited planets, as our Sun seems to have, and to which it gives light and life. If, on a calm starlight night, with the myriads of these suns around us, we ponder on such a thought, the marvels of the heavens are increased manifold. How glorious to think that the whole creation may be resounding with the praises of its Jehovah!

E. And do you think there is any reason for fearing that the Sun may in time burn itself out?

R. Most undoubtedly. Worlds far larger than our Sun have, even in our time, disappeared from the chart. They have apparently ceased to burn, and are no longer visible. I mean others than those called *periodic* stars, which vary in magnitude and brightness at different times—like lighthouse lights; at one time disappearing altogether, and then gradually approaching and increasing in lustre until they attain their crises, and so again receding. If you think again of the space between the first and second group of planets, and the regular order there is otherwise between them, and that this space is filled with small bodies or planetoids, which sometimes rush through our atmosphere and

become luminous as meteors, there seems reason to believe, that even a world of our own system has at one time exploded, or been shattered from some cause or other.

E. Another question; if we take the view that Light and Heat are really material, has it ever struck you to enquire what becomes of all that which is not absorbed by the planets? You say the orbit of Neptune is 6,000 millions of miles in diameter—the Sun itself not being one million—while all the planets, planetoids, and sub-planets, moons, and rings rolled together, would not make the third of a million; it follows, therefore, that the most infinitesimal portion only of this light and heat can impinge on these bodies. The question is, then, where does this immensity of material and force go to?

R. If it is material, and as, so far as we know, Matter cannot be destroyed, it must go *somewhere.* But whether it radiates through Space, whether it gets in some way decomposed, whether it may have anything to do with the comets, or whether it finds its way back to the Sun, in some form available for re-use, or what really does become of it, we know not. Enough heat comes from it, it is said, to dissolve a coating of ice round

it of 10½ miles thick in a single day. But the question after all is, What is Heat?

E. I thought Sir Isaac Newton had settled it, that Light and Heat were absolute particles of Matter, moving in waves of such immense rapidity, as made up for the distance (1,000 miles) which he believed separated them; so that, travelling at the rate of 192,000 miles a second, still 192 of these atoms would strike the eye in that space of time?

R. That was the theory held, and which is still held, by many, no doubt; I will tabulate for you all we seem to know up to this date: always premising that what is *new*, is not necessarily *true.*

1st. You know there is an atmosphere, or Matter in a very easily-moved form, around you. You cannot see it, but you can feel it when in motion—whether as a gentle breeze (5 miles an hour), a strong wind (30), or a violent hurricane (100); and water is, as I have said, Matter in a less easily moved form. If you cast a stone into the water, it forms little waves or undulations; if you ring a bell, the solid matter of the bell vibrates and causes shocks or waves on the air in contact with it, which waves, striking the

drum of the ear, the sound or impression is carried to the sensorium at the base of the brain. The undulations or ripples in the water travel very slowly, in the air at the rate of 1,130 (1,142 ?) feet a second—each wave being about an inch long. But it is imagined — because it cannot be proved— that all space is filled, for one thing, with an infinitely more tenuous fluid, called Ether; the vibrations of which move, not at 1,130 feet a second, but at the rate of 192,000 miles. One thing is very certain—even on Sir David Brewster's own showing—that the waves of this vibratile Ether must be so infinitely small and so infinitely rapid, as *to be virtually material.* If air is 770 times lighter than water, then, judged by the vibrations, Ether must be 900,000 times lighter than air. On this theory, it is supposed, that heated and lighted bodies produce a vibration of it, just as the vibration of the bell causes undulations or ripples in the air, and that the "light" vibrations of the Ether (and not of material atoms) affect the nerve of the eye just as those of the air do the ear.

2nd. The first effect of the wave-motion of Ether—it being of greater length and duration—is Heat; if the vibration be in-

creased, Light results; and if still further increased, we get the actinic or chemical ray; but all the three rays are united in one bundle in the solar ray.

3rd. This chemical ray causes decomposition, and consequent development of Electricity, on whatever substance it falls; but artificial light has no actinic ray.

4th. The chemical ray assists Germination (Spring), the Light ray the formation of woody tissues (Summer), and the Heat ray the flowering and fruiting of plants (Autumn). A blue glass allows the actinic ray to pass, but stops the others; and a yellow glass allows the others to pass, but stops the actinic.

5th. There is every reason to believe that Light acts on the red blood-globule as it does on the chorophyll of plants. Absence or partial absence of Light blanches the blood-cell, and partially devitallizes it, and hence the importance of Light as well as air, in and about our dwellings.

6th. Colour is said to be owing to the different lengths of the Light wave, and to the number of undulations in a given time. A prismatic ray is composed of primary and secondary colours. The primaries are those

in italics: violet, indigo, *blue*, green, *yellow*, orange, *red*. If all the colours in the ray of Light are reflected, the body looks white; if all are absorbed, it looks black. Objects are coloured because they reflect a particular colour; and they are of different colours, because of their different substances and different chemical properties. I am bound to give you the scientific explanation, though I am also bound to confess that, in one particular, I cannot quite realize it. Were it a case of microscopic or telescopic measurement, it would be very different, and one might hope to have some practical assurance of its truth; but we are asked to believe, that when the eye sees a *red* light, for instance, the retina or nervous membrane at the back of the eye, *trembles* or *vibrates*, at the rate of 457 billions of times in a *second of time!* (Lardner.) Newton seems unquestionably to have proved, that the waves of colour are of different lengths. In red there are 37,640 ripples in an inch, in yellow 44,000, and in blue 51,000. As all these waves travel in a ray of white light at the same rate, they must in that case enter the eye at the same time—the formula for red light being, 12 × 3 × 1,760 × 37,640 × 192,000 = 457,895,116,800,000.

I may, however, observe, that neither Arago nor Herschel allude in any marked manner to the Vibration-of-Ether theory.

7th. It would seem from the spectrum-analysis, that particles of burning metals also form a metallic ray in solar Light, as, *it is said*, we may detect so small a portion as the 180,000,000th of some of them. This certainly looks like the materiality of Light. I have explained, on the view at present held, how the particles pass from the body of the Sun, through the atmosphere to the photosphere, and are there consumed. Can it be possible that there is any delusion or mistake here, and that these spectrum-analysis colours may be owing to the combustion of metallic atoms, floating about in space, and coming in contact with the outer surface of the photosphere? If the Sun is regarded as merely a gigantic generator of Electricity, there is no reason at all why it should not be inhabited; while, on the new theory, it is impossible.

8th. We may have Heat without Light, but it is very doubtful if we can *have Light without Heat.* In the glow-worm, fire-flies, phosphorescent fishes, as well as in decaying wood, where phosphorus seems to be burnt in some form or other, I have no doubt there

must be Heat, *if we could measure it.* As for the Aurora Borealis, except that it seems to be some form of Electricity—possibly magnetic—our knowledge is too limited to enable us to say much about it at present. Magnetism is another form of Electricity. Loadstone—a protoxide of iron—is a natural magnet; it will not only attract pieces of iron to it, but when allowed free play, as when suspended by a string, its extremities point to the north and south poles.

9th. We may conclude that Light, while by its actinic ray it developes in bodies one form of Electricity, does not contain any electrical ray.

E. Then do you make out that Electricity is more intimately connected with bodies upon the Earth, than Light and Heat, and that it cannot over-leap any very great distance?

R. I do; and it is also more distinctly a *Force.* You may explain Light and Heat on a Vibration-of-Ether theory, but I confess I cannot see how you are to explain either frictional or galvanic Electricity—that produced by chemical action. The more I think and weigh over all the points connected with it, the more I am convinced that great disco-

veries will yet be made, and that Science should bend all its energies to unravel the problems which surround it. When we can bind its power, its heat, and its light to our will, a new era will dawn on human progress; and I am sanguine that the day will surely come. That it moves more rapidly than Light seems most probable, if not certain; some say as lightning, 250,000 miles in a second, along copper wire 288,000, and along iron wire 15 to 20,000 miles a second. You may make it travel again so slowly, that you may see it pass along the whole course, which you cannot do with Light.

E. Are you considering it now as two fluids or one?

R. For simplicity, we may take Franklin's view that there is but one; easily disturbed and surging about, as we see the waves of the sea do, in different quantities over the *surfaces* of bodies. When it is equal in all its parts, then it is at rest, or in equilibrio, like smooth water; but if it fluctuates, so that there is more in one part (positive or plus), and less in another (negative or minus), there is a most violent yearning, so to speak, on the part of the plus to pass to the minus, like water seeking its level. Thus, if the

clouds are plus and the earth minus, the plus will pass as in lightning, shattering every thing which impedes its tendency to equilibrium. I am quite aware that Light will magnetise iron, and of the sudden rush of Light over one of the solar spots seeming to affect the magnetic needle (observation at Kew, Sept. 1, 1859); but if you will calmly consider the nature of Electricity, whether as two fluids or one, its intense disinclination to be separated for any great distance, the terrific violence with which it rushes into equilibrium with a speed greater than that of Light, its leaping from point to point as it does so, to catch the best conductors, the perfection with which it may be insulated, and, especially, accumulated, the similarity of its action to nervous phenomena, its distinct *force* character, and the impossibility of explaining this on any vibration-theory however rapid, I think you will come to the opinion I have advanced. If there *is* any Electricity in the solar light, may it not be as Magnetism combined with the actinic and metallic rays? Again, are not the chemical decompositions going constantly on in the globe-life, the great source or fountain of Electricity?

E. You have mentioned *Space* several times, and we might as well clear that point up now. We cannot imagine the space between all the heavenly bodies to be a vacuum, and the question is, What fills it?

R. First, there is the Air and its compounds—carbonic acid and oxide, ozone, &c., &c.; but this is a mere trifle, whether it extends 45 miles or 45,000; then (2), as we cannot imagine that all the particles of Matter coalesced in the formation of the solar system, there are, most probably, sparsely scattered atoms of the elementary substances. Then (3), there is the extremely tenuous Ether, suggested to explain the difficulties about Light and Heat; and if there is a medium for the transmission of these, there may be media also for others.

E. Pray what? I cannot imagine any.

R. Perhaps not; but wise and good men have imagined that there may be also (4) a still more subtile medium for *thought*, and that every thought may record itself, by some secret telegraphy, in "chambers of imagery," to be witnesses against us in the future; and whatever there may be for intellectual thought, there certainly is one (5) for spiritual aspirations and communings—

those soul-breathings which we call prayers —"uttered or unexpressed." For anything we know, also—nay, I think it exceedingly probable—the odyle of Reichenbach may yet turn out to be the central ray from which all the Imponderables spring. How know we that Heat, Light, and Electricity—each having its sub-divisions, like the secondary from the primary rays of colour, may not yet be detected to be the body, mind, and spirit, as it were, of one Force still more subtile than all?

E. Even I have no doubt of that; but you say there is a medium for prayer,—tell me what it may be?

R. Nay, what can it be but *The Spirit?* which, whatever else is in Space, you well know *must* fill it. Rely upon it—and it is a fearful thought—that when a man turns either to bless or curse his God, *his God is very close at hand!* The Great Spirit laves, it bathes, it soaks him through and through, *if he only knew it.* And when the soul does "turn" in its agonies towards the Author of Spirits, rely upon it, also, that a responsive thrill throbs through the whole universe! Can it be otherwise? Wherever creation extends—far as the East is from

the West—the vibration of a true soul-breathing must undulate, in that "light which lighteth every man who cometh into the world," throughout all Space! The ripple of a sincere yearning prayer, we may answer for it, will never break but at the footstool of God's throne!

E. 'Tis an awful thought!

R. Awful! I could almost laugh or weep —I know not which. Why, you will see men, sir, such imbeciles as to pretend to guage God by a compass! They can only find God, they fancy, within four walls. They must send their sounds towards what they call the East, or God won't hear them; and they must put Heaven here or there, as they will, or He can have no home. Do they think that God, *a Spirit*, and the Ruler of the universe, is focussed at Jerusalem, or Mecca? They forget that what is *up* at *noon*, is *down* at *midnight;* that what is East at evensong, is West at matins; and that this again is altered at the Antipodes. The fire-worshippers were far wiser in their day; they caught their God at both ends. Truly, as Festus says, "Men never will be wise, till they are fools for ever!"

E. I see all this madness touches you

upon the raw; let us change the subject, and hear how the Atheists account for *Life*, whether in the plants or animals.

R. They affirm that Life commences spontaneously in a jelly or slime-like substance (blastema, cyto-blastema, protoplasm, albumen, plastic material), which, acted upon by Electricity or some of its compounds, developes the first germ or life-atom; that this goes on leavening, expanding, and adapting itself in one unbroken chain, each race superior to the last, and each race blending link by link with the succeeding ones, until it reaches the highest type of all in Man himself. Now this is their argument, and it behoves you to weigh it carefully.

E. I understand it perfectly. They mean to say, that as the Earth grew in geological complexity, so the vegetable and animal life advanced in the same proportion.

R. Exactly. Thus, in the first or Azoic period (Igneous and Hypozoic in Geology, and 1st Biblical era), as there was only rock and water, no life was present. In the first half of the Palæozoic, up to the Carboniferous (2nd Biblical era), we find zoophytes, half vegetables and half animals, and a few low vertebrate fishes. In the 2nd half of the

Palæozoic (Carboniferous and 3rd Biblical era), we find little added among animals but a few reptiles; yet there are marvellous vegetable growths, forming our present coal-fields. In the Triassic (4th Biblical era), we find the same. In the Oolitic and Cretaceous (5th Biblical era), we have gigantic birds, and monstrous reptiles of huge bulk and massive scales. And lastly, in the Tertiary (6th Biblical era), we have not only an immense increase in fishes, reptiles, and birds, but Man himself, finally, as lord of all. If you will check off this description with the first chapter of Genesis, you will find how nearly it corresponds.

E. I must confess that Science seems to keep wonderfully close to the Biblical account, and if Moses really did write it so many thousands of years ago, it seems impossible to conceive how he could have done so by any power short of inspiration.

R. Yes; for Hugh Miller has shown that if the Biblical days and nights are regarded as so many lifts of the curtain, separating a series of visions which God revealed to the eye of His servant—the Seer, this account very fairly corresponds with that of Science. Thus, Moses describes the Sun, Moon, and

stars, as made in the 4th stage or era; because the atmosphere having then become clear, they came, for the first time, on his view.

E. Then supposing they have got the first starting point, the Atheists assume a law of development and adaptation. What do they mean by that?

R. They mean that there is a gradual unfolding of properties or faculties, which the surroundings, or the localities of the life itself, induce as necessary (doctrine of necessity), not only to its *existence*, but to its progress; indicating thereby, Mind and Will in Matter. Thus, creatures with fins, &c., are developed for water (fishes); half-fishes and half-animals (reptiles), for soft muddy banks or lagoons; stronger limbed creatures for dry land, winged ones for the air, and all the immense variations requisite for them to obtain their particular food as well as for defence and protection.

E. And is there ground for this belief?

R. Yes; whichever organ you commence with, you can trace it up from its rudiments in the lower animals, through the whole chain of complicated existences. Thus, the cilium of the cell becomes the fin of the fish;

the webbed foot of the reptile, the wing of the bird and the bat; the trowel of the mole, the fore-leg of the lion and the horse, and the arm of man. The four-cavitied heart of the mammal may be traced through the three of the crocodile, the two of the frog, the one of the fish, back to the faintest irregular ripple along the curved tube of the earth-worm. So again the cellular structure of the human lung—that wonderful chemical apparatus—runs back through the exposed gills of the fish, through the separate cavities of the spiders, to the single sac of the mollusc—which acts, in the simplest species, both for lung and stomach. Even the circulation of the sap, and the respiration by the leaves in plants, may be also traced back, from the most complex, to the most simple.

E. Now suppose we concede to them for a moment, this origin of Life—how do they account for Mind—putting out of the question, Conscience and Soul, or Spirit?

R. We shall have to allude to Life again; but as to your question, there can be no other answer—not that they define it in such a scientific way—than that as the organ becomes more complicated and delicate, so

the influences of the laws and forces become more subtile, and new emanations—call them what you will—must arise from it.

E. Then do you mean to take their side here, and affirm that there is such a connection between Mind and Matter, that depth of thought or intellect is proportionate to the size of the brain?

R. Yes, all things being equal; for you must understand there is as much difference in the calibre, or quality of brains, as there is in any other manufactured articles. A small brain of finer texture, whether by gift or accident (as you like to put it at present), or by training or education, where the nerve-vesicles (little bladders) are crowded, and the convolutions are very unsymmetrical, will be more capacious of thought than one in which, though larger as a mass, the nerve-vesicles are more sparsely scattered.

E. Is that really so?

R. It is. For instance, Byron had the smallest head in a mixed company of thirteen. Neither is that all; for, commencing in the lower creatures, say the molluscs (and, disgusting as they seem, you are more nearly allied to them than you think), where it is a simple chain of ganglia around the mouth

of the alimentary canal, you will, by adding portions of white and grey nervous matter through the long progression of animal life —you will, I say, at last reach our own complex, spinal, and cerebral development. Nor is even that all, for with every portion you add, there will be, as a rule, a corresponding amount of intelligence; so that while instinctive sensation and volition are confined to the spine and sensorium, when you add the lower portions of the brain, you get memory and judgment; the middle portions, thought, ideas, or imagination; and the higher portions, the noblest faculties of the human intellect.

E. Upon my word, if you go on in this way, I am pretty sure I shall become an Infidel also; the reasoning is plausible enough, and I had no idea he had half as much to say for himself.

R. I am not at all afraid of you, and you must bear in mind, that, as a general rule, this is so—and mainly among the vertebrates. But here and there the strangest anomalies occur. Thus, whole tribes of insects and mammal cetacea are an incomprehensible enigma. The dolphins, porpoises, and seals, may really be said to be mer-

maids and mermen ; for they have not only a brain very nearly approaching to man's in structure, but most of their other organs are of the very highest type, placed in the locomotary apparatus of the fish. Either the great part of the brain must be torpid, or the autobiography of a dolphin would be marvellously interesting. You will find as good an account as any, of this extraordinary species, by Monsieur F. Cuvier, in Dr. Todd's Encyclopædia, vol. 1. p. 562.

E. I have always been deeply interested in this subject, and I should be glad if you would put me down, from your own examinations of writers, what we may fairly consider to be reasonable conclusions as to the relation of intellect with the size and structure of the brain.

R. I suspect we shall have to discuss this matter in closer dissection as we pass on, but just now I will say this :

1st. That a larger brain marks a larger intelligence, provided there are the same number of nerve-vesicles in a given space, and that these vesicles are of the same quality. As a rule, therefore, you may unquestionably settle it, that, with a small brain there is a corresponding diminution of

thought, or ideal force. When you see a man with a large head, who has had a reasonable brain-training, but who manifests no great mental capacity, though you can't properly say he is a "thick head," you can say he has probably a thick *skull;* the extra size being entirely owing to the thickness of its two tables with the diploë between.

2nd. That, in the inferior races, as Tiedemann has pointed out, the symmetry of the convolutions is exact.

3rd. That the more the convolutions are unsymmetrical, the greater is the amount of thought-power; and still more if they are close and deep as well.

4th. The quantity of phosphorus in the brain seems also a clear indication of the degree of intellectual power. Thus, in every one hundred parts, it forms, in Infants ·80, Youth 1·65, Adults 1·80, Prime of life 2·0, Old Age 1·0, Idiotcy ·85. As an average brain weighs 50 ounces, so it must contain the enormous amount of one solid ounce of phosphorus. The other constituents of brain are, albumen 9·5, fat 6·0, osmazome and salts, 10·2, water 72·5. The albumen in the brain seems to contain about as much free sulphur, as the fat contains of

free phosphorus. The brain in women weighs $\frac{1}{8}$ less than that of men. I wish you very carefully to note that all these pure *materialities* are guages or measurements of *Mind.*

5th. That education and training not only exalt the quality and the rapidity of the combined action of the nerve-vesicles, but probably may increase their number by stimulating their growth.

6th. That the pigment or colouring matter of the brain is deeper in some parts than in others, and that the nerve-vesicles are of various sizes and shapes; but that all investigations have failed so far to explain the meaning of this difference of colour, or the way in which the caudate (tailed) cells communicate with each other, though there is every reason to believe that they do.

7th. That as to the theory of Dr. Wigan, that there are virtually two minds in the same brain—one in each hemisphere—a powerful and steady judgment existing when they act in unison, and an eccentric or unsteady one when they do not, though it would explain many curious phases of thought, both when asleep and when awake; as yet there are no sure data to confirm it.

8th. As to Phrenology, or the localization of the faculties of the brain, we can only repeat the opinion of Sir Henry Holland: "An impartial view," he says, "requires, not that the doctrine should be put aside altogether, but that great abatement should be made of its pretensions as a system."

Now, although we might not be able to say from an examination of the brain, whether the owner had been a mathematician or a poet, yet we certainly could estimate the amount of Mind he possessed, by (1), the amount of phosphorus it contains (and one would like to know *whether a man could have any ideas at all* without phosphorus in his brain); (2), the number of nerve-vesicles; (3), the unsymmetry of the convolutions; and (4), their closeness and depth. And now, if you please, we must proceed with our enquiries.

E. Let us then begin with Spontaneous Generation—that seems most important.

R. Careful observations have proved that air and water are full of the germs of living organisms; so full, that if you were to place water distilled through a red-hot iron

tube for some time in any exposed situation, you would find it alive with life; and careful experiments have proved, that when these structures have all been destroyed in the substances used, no such generation results. I am now speaking, bear in mind, of the *origination* of beings. When they *do* exist, the mode of *reproduction* is various. Thus, in the lowest classes, it does seem absolutely spontaneous, whether it is (1) Fissiparous, where the animal divides into two or more parts; or (2) Gemmiparous, where the young sprout from the parent like buds from a tree, separating at last and living independently; but in both cases preserving the parental resemblances.

E. Can you tell me anything about this Life?

R. I shall not trouble you with a single definition which physiologists have compounded to describe Life, because they are really so many phrases to disguise our ignorance. I prefer to tell you what we know of the commencement of Life in Oviparous, or the higher classes of animals.

E. I shall listen with the most intense interest.

R. 1st. There must be a nidus, or pabu-

lum. 2nd. A nucleated germ-cell resting on this pabulum, and which pabulum or food the germ-cell can assimilate until it is strong enough to exist alone. 3rd. A shock or impulse which sets the growth of the nucleated germ-cell in motion.

E. But how is this shock or impulse effected?

R. It seems now established—and remember I am opening up mysteries which have been the dispute of centuries—that the germ-cell of one sex must come into actual contact with that of the other. Sometimes this, as in fishes and batrachians, suffices; in other cases, that of one seems to find its way through the cell-wall of the other. It is suspected that an opening may be left for this purpose, but whether it is so or not, we have not yet been able to discover. I think it may be stated as a broad fact, however, that in all cases of the highest life-class, a blending or mixing of the contents of the two cells is necessary.

E. You mention only one germ-cell—do you mean to imply that men, animals, and vegetables, may originate from the same cell?

R. No; but I think if you saw the three cells under the microscope, you would not

be able to tell the difference, except in size. I am very doubtful whether most of us could swear which was that of a moderately complex animal, and which that of the sublimest specimen of humanity.

E. And do you fancy the impulse to be the same in each of the three cases?

R. In the two former I have no doubt it is the same, and probably a modification of it in the case of the vegetable.

E. And do you imagine that the primal cell of one, under favourable circumstances could be converted into the others?

R. No. We are led to believe that each must run its own course to its own end; but the pollen of one will certainly affect the stigmata of a similar species of plants.

E. Then supposing the animal and vegetable cells *are* stirred into life, what then?

R. The vegetable cell, by "cleavage," or "segmentation," as it is called, forms three layers of cells which unite into three membranes, and become the upper, middle, and under surfaces of the leaf; and of these—as the giant intellect of Göethe detected—all other parts of the plant are only modifications. Thus, the fruit is simply the leaf joining at the edges; the inner membrane

developing into the stone, the middle swelling into the pulp, and the outer into the rind. In the same way the animal cell, by the same cleavage or segmentation, forms three layers of cells, which unite into membranes or skins, one within the other. The outer, by its duplications and reduplications, produces the skin, muscles, and bones; the inner, the lungs and digestive organs, &c; and the middle, the vascular system—the heart and blood-vessels. In animals and man there is something more, for a *streak* has been perceived at the outer surface of the external membrane, which developes into the brain and spinal system; regulating and controlling the action of the whole. Allow me to qualify the word "streak." I have used it as defining the line on the outer surface of the germ-cell, the first appearance of the brain and spinal column. I am anxious to make you understand what I mean by it. I make a scratch an inch long, with a diamond, on this pane of glass, thus ————. In this glassy trench, 200 foci of humanity may be easily buried; and if you take off the extraneous swaddling-clothes of each cell, you may put therein the microscopic rudiments of the

bodies, minds, and souls, of 1,000 human beings; all of whom—and some, it may be, undeveloped Miltons, Newtons and Bacons—after living their little day, may have their requiems sung by the mournful wind, sighing over a thousand grassy mounds in every part of the earth. When you have tried to realize all this—and I believe it is all perfectly true—you will also realize what the size of the streak itself must be.

E. Wonderful! And what size then, pray, are these cells?

R. Certainly not half the size of the smallest champagne bubble, because they are scarcely perceptible to the naked eye; and remember, I am speaking now of the human cell. You may put 25, end-ways, in a space the $\frac{1}{8}$ of an inch long; and 1,000 of them put in the scales would not turn a grain weight, the $\frac{1}{480}$ of an ounce! Will you try to grasp *this* fact? or, that the microcosms of all the inhabitants of Ireland and Scotland should weigh little more than a pound! And yet, after all, this is a mere trifle—the merest of trifles—if you reflect, that there is not only the physical, but the psychological development as well. That, from this tiny atom, not only springs a living being, but that there is

impressed in or on this cell, the psychological stamp of sex, outward conformation, hereditary tendencies—both as to mind and body, and these again both of health and disease—nay, those intellectual forces also which may sway the destinies of Empires and of millions of human beings yet unborn. That almost imperceptible point is, in fact, a concentration or essence of the future peasant, poet, prince, or philosopher. I often think, when we are chuckling over our proud intellectuality (!), our *noble birth* (!), or the number of pieces of metal we have scrambled together (!), it would be as well to associate with our crests and coats of arms (a mania we all develope into, however humble our origin), the sketch of a little nucleated cell, to show us what we really are, to remind us that the most contemptible rascal on the face of the earth springs from a twin-cell, and I may add, to remind us that not we only, but the very nations themselves are less than nothing in the sight of Him with whom we have to do.

E. I am afraid you might almost have spared your homily, though it is well deserved, no doubt; but I must confess, I should wonderfully like to see these famous cells.

R. I will give you the very best and most accurate drawing of them I am able, and I will place them in juxtaposition, that you may judge of them for yourself. It will also explain to you the form of a healthy nucleated cell—the foundation of all organized structures.

VEGETABLE CELL.
700 diameters.

MOLLUSC CELL.
200 diameters.

HUMAN CELL.
200 diameters.

The central spot represents the nucleolus, the middle ring the nucleus, and the outer circle the cell-wall, or the "parent cell."

E. Well, one thing is manifest, the Infidel has received a terrible shake; it is difficult, nay, impossible, to understand that any fortuitous arrangement of atoms can account for such a result as this.

R. No; and I should like to put one or two points more for you to study in your quiet moments. (1) You may take it as a fact, that we all—no matter how differently placed by Providence—sprang from that microscopic dot; and we know that, not only the colour of the hair, of the eyes, or the

length of the nose, but even deformities are transmitted through many generations. Now that peculiarity, or that deformity (it is impossible to explain it away), whether of the eye, or the lip, or the limb, *must have been in that little cell*, because this deformity or peculiarity was perceived at the birth of the individual, and could have come from nowhere else. The constant marvel to me has always been, not that we are born without deformities, but that we are not born with. (2) Take now the tendency to any hereditary disease, say, Cancer. Cancer is the growth of masses of jagged and caudate cells (tailed), circulating in the blood and fixing themselves, usually, on the tenderest parts of the frame (and often in the most lovely of God's creations), where they grow, and glut, and propagate, like so many ruthless demons. Sometimes the blood will wash a few of them away from their first colonization, and send them cruising about, like so many savage pirates, to find some other suitable shore where they can carry on their deadly work. Hence you see, unless we can destroy the fiend in the blood itself, how little real hope there is from other treatment. I mention this fact, to show you the importance of these

little atoms. If you had seen, as I have, some beautiful being—the centre of a joyous home, a loving wife, a doting mother, the hope and happiness of many hearts, doomed to such a fate by such a cause, you would swell with a spirit of such uncontrollable hatred against them, as you can scarcely conceive. But while I exult in the hope that we are doing *something* to annihilate this monster (and it looks a monster, if you saw it),

EXAMPLE OF CANCER CELLS,
Containing nucleated sub-cells. Length, 1-1000th to 1-500th of an inch; width, 1-2500th to 1-2000th of an inch. *Magnified* 400 *diameters.* Taken from Dr. Walshe's work on Cancer.

my duty now is, to ask you where this cancer-cell—though it must have been transmitted in the germ-cell, some way or other—has been lurking for the 30 or 40 years before it manifested itself?

E. I am positively stupefied with amazement! Do I really grasp the truth, that a human being, with all his characteristics of Sex! Size! Form! Passions! Diseases and

Tendencies! Mind and Soul! has been shut up and compressed—as you close a telescope—into a speck which you can scarcely see?

R. Even so, and amazing it is, no doubt; but I have not done; for there is a third point I wish to commend to your attention. When every leaf falls from the tree in Autumn, it also leaves a bud in the axil of the leaf for the next year; and there is, throughout all Botany, what is called a "growing point." Then, if the colour of the hair and of the eyes, or, say, the special form of the nose, has been preserved in families for generations, must there not also have been a growing point in it as well, to carry on these specialities? and if so, where in times past did it begin?

E. I repeat, it is incomprehensibly marvellous. And there comes up another strange question. When does a man begin to have a mind and a soul? That he has them, we are assured, and they must have had a commencement—but when? Was it when the germ-cell was vivified? Was it at birth, when he is said to breathe the breath of life? or was it some time after birth? and if so, how were they planted? These seem

to me questions not at all easy of solution.

R. I will give you my view, and then you can form your own conclusions. When the cell is vivified, there comes Life; and with Life, there must come the germs of Mind and Soul. But, mystery of mysteries, who is to explain this for us? That they must be there, in that instant, seems to me to be certain; just as Life and Instinct, or instinctive Reason, must be in the animal cells; but how? It is a shut door, which all the genius in the world must leave closed. When the Mind and the Soul begin to develope themselves, is clearer. The Mind begins to grow as soon as the channels to the brain—the Senses—are thrown open, and admit sensations. The moment the light enters the eye of the new-born babe, and the words of soothing love fall upon its ear, that very moment, the Mind commences its first unfoldings. And when, it may be 20, 30, or even 50 years after birth, the light and warmth of God's love first enters the barren Soul, and thrills it to its inmost core, that period is the first unfolding—the genesis of the Spirit-germ. But we may not linger on this fascinating topic.

E. Just one moment more. All organized life, I am to understand, is carried on by these nucleated cells. Will you explain to me the growth of this cell in its ordinary functions and modes of existence?

R. There is an infinitely minute bladder which has a little spot on one side, and which is called, as I have said, a nucleolus; around this there is another cell-wall, which is called a nucleus. If it is the ordinary secreting cell, whether of perspiration, bile, &c., it fills and bursts, the contents escape, the nucleus grows into the parent cell, the nucleolus becomes in its turn the nucleus, and so on. Sometimes, the parent cell contains many such nuclei, which are all set free when the cell-wall breaks, and all of which grow into parent cells. In other cases, the cells arrange themselves side by side, and form membranes; in others, they range themselves end to end, and the partitions being removed, tubes are formed. Sometimes the walls of these cells are strengthened with lime, forming bone, hoofs, hair, or nails.

E. I will press you to answer one more question on this interesting subject, and *I* will take the responsibility of asking it. Can

you tell me anything more about the shock or impulse, which communicates, or produces, or generates (use any term you like) Life?

R. We suspect that it may be some peculiarly modified form of Electricity—shall we say given off by organic chemical action, *i. e.*, from the mutual change induced by the blending of the contents of the two cells?

E. Why?

R. 1st. Here on this table is a pint measure, which contains the cells of one sex of fishes, only a few grains, say, diluted with a pint of water; and here on this plate are the ova of the other sex. I take a little of the fluid from the pint measure, on the point of this needle; I touch one of these ova, and instantaneously a change takes place within that ovum, *Life commences*, and *a fish begins to grow.*

E. Astounding!

R. Let me go on.

2nd. Whether it has really anything to do with chemical affinity, I leave you yourself to decide; but the reproductive elements of different animals have different chemical compositions, or constitutions—that seems to be determined.

E. What! are you manufacturing Life as if

you were a chemist? Is vitality only a compound of electrical and chemical action?

R. Repress your excitement, I beg—I am dealing only with simple truths; you must reason it out your own way. I cannot resist facts, and the changes of organic chemistry seem endless.

3rd. Dr. Faraday proved the identity of electrical attraction with chemical affinity; and Electricity is undoubtedly evolved during *the ordinary processes of growth* in plants and animals.

4th. Vital seems intimately analogous to nervous force, and it is very singular, that phosphorus enters largely, not only into the composition of the nervous centres and tissue, but also into that of the ova of animals; so much so, that I feel in my own mind pretty clear, if there were no phosphorus in the brain, there could be no *thought*, and if there were no phosphorus in the ovum there could be no *Life*. It is a much more important element in the arcana of Nature than is commonly supposed.

E. But——

R. "But me no buts," and allow me to continue.

5th. There is a very limited part of the

cervical portion of the spinal column (and which all through has the most intimate analogy to an electrical battery), any injury to which ends life, as by a flash of lightning, which you know is a form of Electricity.

6th. Nervous action as to transmission, and many other peculiarities, is decided to be very nearly allied to Electricity; no other power is so like it.

7th. If the experiments and statements of Quatrefages are to be depended upon, he has proved *nervous to be correlative with electrical force.*

E. I must weigh all this carefully over; it is much too serious to be received unquestioned. Another point is, Have vegetables any nerves?

R. Not as we understand them; but some plants have powers of sensibility and contractility very similar to nervous and muscular action. We see this in what has been termed the sleep of plants, as in the daisy, convolvulus, crocus, night-scented-stock, closing their petals with the close of day. Some are so sensitive as to close immediately when touched, or even when a cloud passes over them, as the "poor man's weather-glass." Nay, some plants, in their

search for food, manifest apparently a low form of instinct; but whether it is really this, or merely the result of external stimulation, we can scarcely determine. Thus, a root will sometimes grow down the sheer face of the rock, to reach the moisture at the bottom; and pitcher-plants, growing where rain falls only at long intervals, will open their lids when empty, and close them to prevent evaporation when full.

E. Then I am to understand, that the ultimate point to which you can drive Life back, is, to the vegetable cell and its nidus slime?

R. Yes, if you say organized or cellular Life. But the most astounding fact is, that Life has, at least, its analogies in the Mineral world, and that a shadowy region exists between the confines of the Vegetable, and the dawning of the Animal, where no man—even with the aid of powerful microscopes (witness the diatomaceæ)—can tell what the creature may be; just as in the capillaries, between the veins and the arteries, there is a point where the carbonized and oxygenized globules blend.

E. Your argument is, then, that one continuous chain of the *same* Life, runs from

the highest organized being, down to the lowest inorganic atom?

R. Just so. For instance, angularity has been regarded as a character of inorganic Matter, and the branched or curved form, of organic; but we see curves in some crystals, certain ores of manganese, copper, and silver; while, on the other hand, we see branched forms in hoar-frost, alabaster, native silver, and copper, and artificial deposits of lead and zinc. Besides, crystals often contain cells, and flint-nodules frequently resemble nucleated cells. The walls of chambers, again, are sometimes laminated, as in oolite, and pisolite; or where there is no chamber, as in pitch-stone and porphyry.

E. I cannot allow this; all these may be merely accidental resemblances.

R. How do you know that? For I may ask what is the attraction, or drawing, of one molecule to another—*chemically*, but the simplest form of Life; and the re-arrangement of numerous atoms in chemical decompositions, a more compound form of that Life—the one typical, say, of simple cell-life, and the other of the more complex forms of organic? Do they not choose or

repel, and exhibit by their union changes of form and properties? At all events, crystallization seems really like Life. The crystal chooses and maintains its figure, until it becomes amorphous, or dies in solution. One crystal blends its form also when united with that of another family. This Life may consist, I grant, of but one immediate act—the change from solution to fixity, but if you saw it under the microscope, you would say it looked still more like "growing," and "living;" and you must remember that, *passing over the gradations,* there is scarcely a greater difference between the life of a crystal and that of a lichen, than there is between that of a lichen and Man. And in the thousands of beautiful and fantastic forms of the limey particles strengthening the coverings of the Echinodermata (especially the Holothuria), always distinct in each species, there is at least a wonderful preservation of size, outline, and even colour. Whether these forms, wheels, anchors, dumb-bells, &c., really arise from an exalted kind of crystallization, or they are moulded by skin glands, I cannot decide upon, but I incline to the former view.

E. That is curious; and is there, do you

say, no true demarcation between vegetables and animals?

R. No; for instance, if you said that vegetables were branched, grew to an immense size by accretion from without, and lived thousands of years,—so are, and do, the structures of the coral polyps; besides, endogens, from accretions from within, must necessarily be short-lived. If you said that you could subdivide or dismember vegetables *ad infinitum*, and that each part would still grow into a distinct plant,—you may say the same of Fissiparous and Gemmiparous creatures, and of many polyps; and it is a common feature in the Crustacea and the Arachnidæ, to reproduce limbs that have been torn off in battle. Or, say the vegetables remain inactive through the winter,—so do many animals in hybernation; or that vegetables cannot move—neither can oysters;—while some actually do move, as the "moving plant." If you put it on the fact that animals had a nervous system, we might reply, that none have been discovered in the sponges; while some plants *seem* to have one, as the "sensitives." Or, again, that animals have stomachs and no roots, and feed on organic substances,—yet

some plants, as the pitcher-tribes, have cavities retaining their food for long intervals, like the camels; fungi, also, feed upon organic substances, give off carbon, absorb oxygen, and contain nitrogen, which are all characteristics of animals. Nay, some plants, as the "catch-fly," actually catch, kill, and absorb the juices of insects. Again, in orchidaceous plants, we see many resemblances to animals. (1), They feed on organic matter. (2), Their rootlets hang loose, like limbs. (3), Their flowers not only imitate the form and colour of animals, but appear as if every moment ready to spring off and separate, as we saw in the Gemmiparous.

E. From all these instances, it appears to me, that the sum total of the vegetables is comprised in the animal.

R. Yes; I arranged them to see if it would strike you; and all animal and vegetable life—I might say all inorganic life also, is summed up in Man. Before we go further, there are one or two very important points to which I wish to allude. The first is, that even if you push Life back to its extremest limits, where you cannot demarcate Electricity and Chemical action

from Vitality, and if you drive Vitality back to its very ultimate forms, you are really no better off—*you have still the need of a Creator;* because, you have first to produce this slime or mucus, and, above all, the wonderful germ-cell; and (2), you have to provide the impulse which stirs it into life. The second is, that instead of being simple, as you might imagine these lower forms of Life to be, the microscope reveals them to us as of marvellous beauty; more strongly indicating, *I* think, the presence of a God-head, than many higher forms. Thus, a space of mould taken from an old decaying boot, appears as a gentleman's park, with trees, and shrubs, and graceful flowers over-hanging shady steeps of glens, and with creatures browsing in its hollows. A small portion of that from common flour paste, discloses a forest of transparent stems, with globes of many-coloured crystal fruit balanced on their summits; and I have watched creatures of gorgeous-hued scales, and having their heads working at an angle with their necks, walking along the tops, feeding as they go. You may say again—as has often been said before—that the more you examine Man's works, the coarser and com-

moner they become, and God's, the more intricate and exquisite.

E. I feel quite subdued by all these strange wonders, and I assure you I am quietly estimating all you say; but I want now to ask you one or two searching questions. You say that Heat, Light, and Electricity—this most wonderful trinity—produce that motion in inorganic Matter which we may plainly call its "Life;" and that if density, porosity, ductility, and other externals are its *body*, these psychological properties may be said to be its *soul.*

R. You have put it very fairly. I do; and we may say it on both the new and old theories.

E. Then do you mean that the self-same agents, acting on subtiler combinations of Matter, form organic life?

R. I do.

E. But has it not an appearance of making these agents divine?

R. Certainly not. These agents, acting on crude or organized Matter, *are the means with which God works.* There is Matter, the substance; the correlative forces, the servants or tools; and the divine power and wisdom which commands or wields them.

In the same way there is the block of marble, the chisel and hammer, and the human skill and intelligence necessary to carve out the statue.

E. Now for a question about this Matter, before you leave it for the present. It is composed, chemists tell us, of solid, liquid, or gaseous bodies, or elements, undecomposable and separate, about 70 in number. The ordinary view is, I believe, that Matter, in the diffused form, may have consisted of *a mixture of molecules from all these bodies;* but has it ever struck you, that all may spring from one single atomic source? What a grand thought that one single, central, molecule of Matter, moulded by the Spirit of God, should be the sole unit of all existences—animate and inanimate!

R. Do you see how you are, unconsciously, perhaps, coming back to what may have been Plato's theory? because, chemically, Plato could scarcely know what we do as to the number of elements; and I am not at all sure that the same idea may not have struck the mind of Sir Isaac Newton himself—that greatest of all modern philosophers.

E. Then you think there is some ground for this fancy?

R. I do. As you break a ray of white Light into several primary and secondary colours, so do we find Matter dividing itself into primary and secondary groups. Thus, we have it diffused, as in gases, and we have metalloids, and non-metalloids. We have a group of gases in Oxygen, Hydrogen, Nitrogen, and Carbon. We have a group of bodies in Potassium, Sodium, Calcium, Lithium, Magnesium, and Barium; one in Chlorine, Bromine, Sodium, and Fluorine; one in Sulphur, Selenium, Phosphorus, and Arsenic; one in Silver, Zinc, Lead, and Aluminium; one in the light and one in the heavier metals. It may be that all these are rays, so to speak, of *one primary atom;* that they are the unfoldings and evolvings of it under the divine will, though man has not yet been able to prove them correlative, as he has the imponderables. How little we really know upon such points is shown by isomeric and polymeric bodies.

E. What are they?

R. Suppose that a substance is composed of 12 atoms of Carbon, 12 of Hydrogen, and 12 of Oxygen (all gases): 36 atoms in all. You might imagine that only one substance could be so formed, but many are.

Thus, we have Gum, Sugar, Tartaric acid, and Starch—these are all isomeric bodies —having the same composition. Again, any multiples of these numbers—polymeric—instead of forming similar, form bodies altogether diverse; proving, therefore, that the same number of atoms may arrange themselves, not only in one, but in several groupings; a different product arising from each re-arrangement. Thus again, Cyanic, Fulminic, and Cyanuric acids, which have *all different properties*, are isomeric; while Aldehyde, Acetic æther, and Butyric acid, are polymeric. Very many fragrant essential oils are isomeric and polymeric with turpentine $C_5 H_4$. Some isomeric bodies *are both poisons and antidotes*—there is a problem for you! And in disease, when the kidney can no longer withdraw urea from the blood, and which is a deadly poison, the mucous membrane of the bowels adds 2 atoms of water (HO) to the urea, and passes it off, as carbonate of ammonia; the form being $C_2 H_4 O_2 N_2$ (urea) × 2HO (water) $2(NH_3CO_2)$ (carbonate of ammonia). Most of the protein compounds are very nearly isomeric with the serum of the blood, and I believe also with that of the brain. So, how do we know,

with respect to Matter, that each of the groups of the elements I have mentioned may not be isomeric or polymeric? There is certainly no greater difference between Starch, Gum, Tartaric acid, and Sugar, than between Sulphur, Selenium, Phosphorus, and Arsenic; and which are all non-metalloids. And it is just as strange that you can have yellow, red, and black Sulphur, or that charcoal and the diamond should be both forms of pure carbon.

E. I cannot tell you how all this fascinates me. All Creation seems as if it might be found, some time or other, resolving itself into one agent, and one form of Matter.

R. Yes; but this is not all. There is to me another thought much more fascinating still. You have seen how Matter and Spirit joined in the great globe-cell life, and you have seen an infinitely minute resemblance of the same in the single germ-cell from which you sprang, and the impulse which gave *it* Life. Well, even in the highest, or most ethereal essences of Man's nature, you may be surprised to hear, that the same analogy holds good; for you may say that Mind—combining Imagination and Reason—is the pabulum or nidus; 2nd, the Soul or

Spirit—of which Conscience is the emanation, manifestation, and monitor of the good and evil of our action, is the germ; and 3rd, God's Holy Spirit, that impulse or influence which sets the spiritual Life in motion, revealing and generating that holy divine principle, which is God in us and we in God—that quickening or new birth; the implantation of that seed which goes on growing, we know not how—first the blade, and then the ear, and then the full corn in the ear. It is this yearning after something better, nobler, and holier, which wages war against our carnal nature; and which, separated by mortal death from the fleshly lusts which it has learned to loathe instead of love, springs glad and radiant, in its new beauty, into the eternal love, and purity, and happiness of God's presence for evermore!

E. But there is no ground for all this, save Revelation?

R. Granted; but for all that, "that which may be known of God is manifest," and the whole globe-history is one continual repetition of resurrections. Can you not detect the same type also in every withered seed you put into the ground coming up again in the resplendent beauty of some lovely flower?

See this brilliant butterfly which flutters in the sunshine, and compare the ugly, greedy, selfish grub (Man over again), with the ethereal creature which has sprung from its mausoleum! Examine this dead, this mortal coil, which it has shuffled off, and which tied it down to earth, and with it before your eyes, doubt not that Man's divine image will be infinitely more glorious.

E. Will you now, please, put me down the several dualities of the different phases of Matter we have passed, so far, in review, that I may grasp them the more thoroughly?

R. With pleasure. I will arrange them in the form of a table.

DUALITIES.

Physical Properties.	*Psychological Properties.*
Matter (1) Ultimate form.	God's Spirit. *Creative.*
Matter (2) Elementary form, *i.e.*, as Elements.	Gravitation.
Matter (3) External properties, Porosity, Density, Hardness, Ductility, &c.	Heat, Light with Actinic ray, Electricity with Compounds, Galvanism, Magnetism, and Chemical Attraction.
Vegetable Organic Cell—Absorption, Elimination, and Digestion.	Sex, Form, Colour, Scent, Properties.
Animal and Human Cell—Do., Do., Do.	Sex, outward conformation, hereditary bias, dispositions, passions, diseases.

Physical Properties.	*Psychological Properties.*
Sensorium.	Sensation and Volition (may they not be analogous to positive and negative Electricity?)
Cerebrum (lowest portion).	Instinct and Reason, Memory and Judgment.
„ (middle portion).	Thought, or Ideas, or Imagination.
„ (highest portion).	Mind in its noblest and highest intellectual sense.
Body.	Soul.—To be quickened into Spiritual life or not, as we will; and of whose future fate Conscience is given to us to be our own Arbiter, carrying thereby our judge in ourselves.
Nature.	God. *Providential.*

You begin with God, and you end with Him.

E. With no possible chance, I think, of misunderstanding your views so far, may I now ask, what the telescope, in *reply* to the Infidel, has to tell us at the other end of Creation?

R. Lord Rosse's great telescope shows us that the fleecy, vaporous, nebulous matter, which the Infidels regarded as diffused particles, is nothing of the sort; that it is a mass of gigantic worlds, so crowded together as to look like dust or sand. We

are also assured, that there are other similar masses beyond them, but still so distant, as to present the same clouded appearance, and which there can be no reasonable doubt, are clusters of suns like the others.

E. Then there is really no proof that these nebulæ are world-formers, as they seemed to be so confident of?

R. That there are, here and there, doubtful appearances in the heavens, as the planetary nebulæ in Orion, I admit; but as to their general statement, that the nebulæ are truly worlds in the course of formation, the telescope gives them an unqualified contradiction; and it seems as if God had only waited for them to fix their folly, to suddenly overwhelm them; for, in every case, more powerful instruments have caused them to vary their ground. Thus, they once declared the *Monad* to be the lowest form of organized life, and from which they took their start; but stronger microscopic powers have proved that there are hosts of beautiful creatures below it, and that it even possesses a fair organization.

E. Then the fact is, no instrument yet invented has bounded space?

R. No; in the heavens there is no Dis-

tance, as in Geology there is no Time. The nebulæ are the milestones of Creation. Telescope after telescope has been constructed to solve them, but they go on receding ever! Sir William Herschel, even in *his* time, and with his instrument, estimated that he could reckon 55 billions of worlds, all larger, and some infinitely so, than ours; and what must Lord Rosse's do compared to his? Although we have thrown the distance back until it takes the Light from these orbs, travelling at the rate of 12 millions of miles in a minute, 30 *millions of years to reach us*, yet we still see, on the confines of our vision, the same appearances which have deceived us so often, and which tell us, baffled and disheartened, that we are as far off as ever! I say 30 millions of years of light-speed! It is too immense for human conception. A locomotive speeding night and day at the rate of 60 miles an hour, would require 22 years to pass over a space which Light would traverse in *one single minute of time!*

E. Now I want to ask you three probing questions as to these heavenly bodies. The first is, Has it ever been surmised that there might be any mathematical law or laws on

which the Universe may be built, thus indicating a distinct *design?*

R. Yes; after Copernicus had demonstrated that the theory of Ptolemy was wrong, and that the Sun did not revolve round the Earth, but the Earth round the Sun, the great Kepler established his three famous laws: (1), That planets revolve in elliptic orbits round the Sun, which occupies the common focus of all their orbits. (2), That if a line be drawn from the centre of the Sun to any planet, this line, as it is carried forward by the planet, will sweep over equal areas in equal portions of time. (3), That the squares of the periodic times of any two planets, are to each other as the cubes of their mean distances from the Sun. Thus, the periodic times of the Earth and Mars are, $365\frac{1}{4}$ and 687. By this law, therefore, the square of $365\frac{1}{4}$ is to the square of 687, as the cube of 91.43 is to that of 139.31. The formulæ being (1) $365\frac{1}{4} \times 365\frac{1}{4} = 133{,}407$; $687 \times 687 = 471{,}969 \div 133{,}407 = 3.5373$. (2) $91.43 \times 91.43 \times 91.43 = 764{,}304$; $139.31 \times 139.31 \times 139.31 = 2{,}703{,}628 \div 764{,}304 = 3.5373$.

E. That is certainly very singular.

R. But perhaps the most interesting law

is that of Bodė, who first published it in the "Connaissance du Ciel Etoilé," in 1772. There are 9 planets—reckoning the planetoids between Mars and Jupiter as having been originally one planet. And it is most extraordinary that, with the exception of the space between Uranus and Neptune, there is a regular Mathematical progression throughout. The law holds good even between *them* if we may make the proportion the same as in the case of the first four. If we divide the millions of miles of distance from the Sun by 9—the number of the planets—we shall see how wonderfully Bode's law corresponds with the most recent computations of astronomers. Of course, the fixed stars are at such an enormous distance that we cannot at present extend such enquiries to them. I have here re-arranged and carried Bode's law somewhat further than has been so far done. If there is, as is suspected, a small planet between Mercury and the Sun, I believe it would form the unit of the progression :—

	Planets.	Millions of Miles from the Sun.	BODE'S LAW.
1	Mercury ...	9	36 = 4 ..... 4 = 4×9 = 36
2.	Venus	9	66 = 7⅓ ..... 3+4 = 7×9 = 63
3.	Earth	9	91 = 10 ..... 2×3+4 = 10×9 = 90
4.	Mars	9	139 = 15½ ..... 2×2×3+4 = 16×9 = 144
5.	Planetoids .	9	252 = 28 ..... 2×2×2×3+4 = 28×9 = 252
6.	Jupiter	9	475 = 53 ..... 2×2×2×2×3+4 = 52×9 = 468
7.	Saturn	9	872 = 97 ..... 2×2×2×2×2×3+4 = 100×9 = 900
8.	Uranus	9	1754 = 195 ..... 2×2×2×2×2×2×3+4 = 196×9 = 1764
9.	Neptune ...	9	2746 = 300 ... 1½×2×2×2×2×2×2×3+4 = 292×9 = 2628

We may take the weight of the Earth as 6,000,000,000 billions of tons (12 cyphers added). Mercury is 20 times smaller than the Earth, but weighs only 10 times less; Venus has the same size and the same density; Mars is 8 times smaller, but has the same density; Jupiter is 1,330 times larger, but only 338½ times heavier; Saturn 857 times larger, 101 heavier; Uranus 82 larger, 14½ heavier; and Neptune 107 larger, and 19 heavier.

Having now shown you all these differences in bulk and weight, with the wonderful laws of Kepler and Bode, it is for you to say whether the structure of the heavens indicates a designing and directing Mind apart from the Matter as *I* say; or whether the mind was inherent to it, the two being inextricably combined — as the Pantheist says; or whether the whole arrangement

was purely accidental—as the Atheist says. Is there, or is there not a Maker and Contriver of the machine, who regulates, controls, and destines it, as He wills?

E. I certainly think the Pantheist is at a disadvantage, because the presumption is against him; but I do not wish to decide rashly. As for the Atheist we will dispense with him altogether. Let us go on to the second question. You said some time ago that our Sun was moving round some other sun. Is anything known of the path or orbit on which it is travelling?

R. The conjectures upon this question are as follows:

1st. From Sir W. Herschel's enquiries, we may consider the Sun as a part of one of those "island universes" of the heavens—the Milky Way; the thickness of which cluster of stars, he computed to be 500 deep, each separated by 10 years of light-travel.

2nd. From Argelander's researches, our Sun with its planets, comets, &c., is moving towards the star marked π in Hercules, at the rate of 33 millions of miles a year (Dr. Lardner says, 154 millions), and which it will take nearly two millions of years to reach.

3rd. From M. Maedler's investigations

on the "central sun," we may regard it as probable that the star Alcyone, in the Pleiades, is the centre of gravity, around which our whole Astral system seems to circle; the Sun accomplishing one revolution, it is said, in 18 millions of years. These can only be probable conjectures, and as such you must receive them.

E. One more question. How far have we gauged space, up to this time?

R. If the distance of Neptune from the sun—3,000 millions of miles—represents *one inch*, the first star beyond will be 7,600 inches, or 210 yards. If you imagine the whole Solar system revolving in the hollow of your hand, and allow a body 200 yards away to mark the *first* star you come to, then, if what I have stated of Lord Rosse's telescope be true—you must place the *last* star we know of, 957,000 miles distant! One inch the boundary of our system, 200 yards the first star, one million of miles the last! In other words, we have measured space in the radius, 180 trillions of miles (180 and 18 cyphers), or 360 trillions for the diameter; and we have every reason to believe that we are only *then on the threshold!* The formulæ of years are: (1) 12 ×

3 × 1,760 × 957,000 × 3,000,000,000 × 2 = 363,813,120,000,000,000,000. (2) 60 × 60 × 24 × 365¼ × 192,000 × 30,000,000 × 2 = 363,543,552,000,000,000,000 the known diameter of space. Stars might be extinguished, and it would not be known on earth for millions of years. 360 trillions of miles in each direction, and still only at the gateway! The whole circumference a drop to the ocean—a grain of sand on the seashore!

E. It is utterly inconceivable! And what says Geology?

R. It tells us there is every reason to believe that five distinct types have existed; that the entire races of creatures have been destroyed several times over, when, in the intervals, the Earth has been devoid of inhabitants; and that at least twenty-eight partial destructions have occurred.

E. That seems decisive; but how did these destructions arise?

R. I have shown you that the Earth was once on fire, and that as it cooled a crust formed on its surface, on which we now live, and whose thickness we may consider, at the present time, to be as that of the shell to the hen's egg. The gases and vapours pent up within the interior, now and again broke

up this crust by volcanic action, as it is called, and accompanied by earthquakes of such tremendous violence, as to make the globe quiver to its very centre. That this was so we know; for long chains of mountains were sometimes projected miles high—as the Himalayas, Andes, and Alps. And, bear in mind, these elevations in their present fixed position, give no idea at all either of the force of the shock, or of the proportion of surface which must have been disturbed. It was by such convulsions that the then existing races of animals and plants were drowned or submerged, and buried in the stratum, or layer, or deposit, arising from such convulsions. Thus, just before the appearance of Man, an awful breaking up of this kind occurred, when the great Alps in Europe, and the Chilian Andes in South America were elevated—the latter extending as they stand even now, 3,000 miles long. Who can calculate the extent of dislodgment, or describe the scene which must have presented itself? "The waters of the seas and oceans, lifted from their beds by this immense perturbation, swept over the con tinents with irresistible force, destroying instantaneously the entire Fauna (animals)

and Flora (plants), and burying their *débris* in the sedimentary deposits which ensued." I allude to this special convulsion, because it made the face of Europe what we now see it, separating England from France by a channel 30 or 40 miles wide.

E. Then a vast portion of the Earth's surface must have been shivered and broken up?

R. Beyond doubt; and we are led to believe also, that, as the Earth gets hotter as we descend—so that at 40 miles every metal will be melted—the interior is literally a molten, fiery mass; and that the sea, piercing to this by cracks and fissures caused by these convulsions, aided the general destruction by terrific steam explosions.

E. And is there really evidence of all this?

R. Certainly; what was once the bottom of the sea, now forms vast deserts of sand; and what was once the lowest igneous or granitic crust, with the remains of the earliest races of creatures, is found on the very highest peaks. These convulsions or upheavings also formed rents, into which the metals were forced as veins or lodes; and hollows were left, which now form caverns

of water, from whence come many of our springs. Sometimes, again, these springs, passing through soluble mineral strata, form *mineral* springs; and coming from greater depths, *hot* springs. Again, heat and pressure combined on the buried vegetable growths—forests of palms, tree-ferns, club-mosses, and gigantic reeds—produced our present coal-fields.

E. And can you prove what kinds of animals existed in these eras?

R. The evidence is written upon the rocks. Each deposit or stratum has its own race of creatures, preserved and fossilized. As Agassiz points out, we may say generally, that all previous to the deposition of the new red sandstone constitutes the reign of fishes; from thence to the chalk, the reign of reptiles; and from thence to the drift, the mammifera. We might, indeed, almost write their histories: they are devouring or being devoured; some are partially digested in the bodies of others, and there are the distinct marks also, of the large rain-drops, the ripples of the ebbing water on the shallow banks, the footprints of elephantine frogs and lizards in the baking mud, just as they were made when the convulsion and explo-

sion occurred—probably millions of years ago. An era of thousands upon thousands of years passes away with a sudden shock—as if the cloud of steam, and smoke, and fire, and flood, and wreck, and ruin, was a veil which God had drawn across, to separate the six stages of His work.

E. What a scene!

R. Yes; our beautiful world in *its* process of growth (as we ourselves are beasts or monsters in *our* process of growth), must have been at times a pandemonium. The atmosphere hot, dense, and lurid; deadly exhalations arising from poisonous morasses; drenching rains, from sudden condensations of moisture; terrific lightning and thunderstorms, from rapid generations of unequal currents of Electricity; constant quiverings and rumblings, with frequent earth-openings and eruptions of volcanoes; and the presence of such infernal monsters as we know existed, must have made it literally a very "hell upon Earth." And thus you see how Life and Death, rest and destruction, are agents in the Almighty's hand to show forth His Power, His Wisdom, and His Glory.

E. Then the plain inference from all this

is, that *there must have been creations and recreations?* If so, the atheist reels under a deadly blow.

R. Yes; and thus belief is justified by another fact. For there is every reason to believe, that when the fearful disruption of the Earth's surface took place at the end of the Tertiary era, immediately before the appearance of Man, such an amount of internal heat was given off, as to convert the water of the seas into immense icebergs; and the same violent shock producing oscillatory motions or rollings of the globe (?), these icebergs swept the whole surface for ages, pounding and triturating the rocks, so as to form the future soil, and necessarily destroying all animal life.

E. And is there positive proof of *this* also?

R. It seems so; this period is called in Geology, "the Glacial era," and it has left its marks upon the rocks in different parts of the world. It is a bold suggestion also, to make, but it appears to me, that this awful convulsion must even have changed the axis of the Earth; for it is certain, that before this last grand catastrophe, the seasons must have been very different to what we now

find them; both plants and animals being of a tropical character in parts where they could not now exist. Thus, in our own land, remains of elephants, hyenas, and tigers, are not unfrequent. You will remember, also, the elephant found in the polar regions, its body having been preserved in the ice, possibly for ages, and still so perfect that the dogs devoured the flesh. Its antiquity was proved by the fact, that it had peculiarities of structure which the present species does not possess. That the axis of the Earth, even in our day, is swinging slowly backwards and forwards, we know; and if it was not then violently interfered with, either the atmosphere was so dense as to retain an immense amount of heat, or the crust of the Earth must have been much hotter than it has been since. That the obliquity of the Ecliptic has uniformly decreased 48″ per century, and that this decrease, if continued, will destroy this obliquity and consequently the Seasons, seems also certain.

E. And how does Geology affect the developmental theory?

R. It simply annihilates it. A law must be perfect, or it is of no use whatever; and

therefore the course of these creations must have been unbroken. The chain must be built up link by link, each succeeding to the other. But some organs are found to get out of their places, to come before their time; thus the Trilobite, which has an eye with 400 perfect lenses, is placed where it ought not to be; and Hugh Miller discovered a still more signal instance at Stromness, in the Asterolopis. Many other examples have since been found.

E. You don't believe then that species may gradually blend with each other?

R. No; in spite of Mr. Darwin and the ingenious author of the "Vestiges of Creation," I can see no reliable proof of it. Each race seems perfectly distinct, and when it dies it does so absolutely, and a fresh series, similar to it, but more advanced, takes its place. There may, it seems probable, be a few generations of hybrids, but they do not endure.

E. I thought your description of the different organs running back through the past ages of Life seemed to imply an unbroken chain?

R. I was speaking of the *organs* and not of the *individuals*. You forget that all races

of creatures have the same organs in one form or other. Now God, in His special providence, might readily vary some organs —as the eye in the Trilobite—adapting it to special circumstances. I say God might do it, as the omnipotent and omnipresent Creator; but when you talk of development by *law*, such an instance could not logically occur. The progression in the divine arrangement has been *general* and not *individual.*

E. Now a thought occurs to me, because I wish to leave no argument untouched, if possible, that the Infidels ought to have some reasons for not accounting for the origin of Matter. Infinite intelligence and infinite adaptation are endowments or properties, and are no arguments to show where it came from.

R. You are right. They say that Matter must be eternal, because it is indestructible and infinitely divisible, which, of course, implies that Space *cannot be circumscribed.*

E. The last seems a strange proposition.

R. It may seem so at first sight, but it is not really so. I have not troubled you with very many of their wild notions, but this is quite sensible and logical. The theory is, that there is no particle of Matter so small,

which you cannot imagine—seeing that it must have two sides, an upper and an under—may not be halved. If, therefore, it has infinite divisibility, it must as a corollary have infinite extent, which it would be a solecism to say could be limited.

E. I should have imagined that the division of Matter would have been very soon ended.

R. Not so soon as you think. For instance; you may coat substances with gold the ten-millionth of an inch in thickness. The boy's soap-bubble, just before it bursts, is the $\frac{1}{2,500,000}$ of an inch in thickness; and chemicals in solution have been divided 70,000,000,000 of times. A grain of musk will perfume a large room for twenty years, and still retain most of its weight. The lowest estimate of this subdivision has made 320 quadrillions of particles, *i.e.* 320,000,000,000,000,000,000,000,000. So vast is this number, that if each particle was a coin, and a man counted day and night at the rate of even half a million in the 24 hours, or 200 millions a year, it would take him 1,600,000 billions of years to accomplish the task! Again, since dogs hunt by scent, the extreme fineness of these atoms diluted

by the air and blown about by the wind, may be still more minute. Again, what size must malarious particles be, or those brewing infectious diseases? A single drop of the blood of the musk deer contains 120 millions of round, plate-like bodies, each of which we can imagine in pieces. The animalcule, Vibrio Undula, is computed to be the 10,000 millionth of the size of a hemp seed; and there are animalcules so small, that one million million may be contained in a single square inch. If the human inhabitants of the earth are 1,000 millions, you could easily hold in your hand 50,000 times that number —50 billions, *i.e.*, 50,000,000,000,000; and yet, remember each one is nearer in size to a man, than a thousand suns are to God's infinite vastness! So full is the air, in certain of its conditions, of living atoms, that thoughtful men have suggested that the disturbance of any object, which has been for some hours at rest, may overturn whole nations of creatures, who in that space of time have lived through a history, just as in dreams you may live years in as many minutes. And yet, you must not forget that all these creatures, whether in the water or the air, must have parts and organs of locomotion and increase;

and if the bulk is so small, you may well surmise what the constituents may be! But another point startles us. That they have volition or will is certain, and if so, must they not have sensations? and if so, perception of pleasure or pain? Who is to measure the sympathies of beings a hundred millions of whom will scarcely fill the eye of a needle! And to show you how very moderate I am, a learned professor, whose word would go a thousand times further than mine, declares in his recently-published book, that such animalcules have digestive organs, veins, arteries, a heart, and even blood-globules floating in the blood! If all these *have* been seen, it only increases the marvel. Marvels! I want you to answer this. Are these marvels greater at the periphery (so to speak) or at the centre? Take one more fact to help you. If the water in which these atoms are sporting, dries up, they become as dust; every breeze of heaven blows them here and there as it lists. But let them be re-moistened by their native element, and they frisk, and wheel, and behave as if their rest had only increased their enjoyment and activity! Who again, is to tell us the connection between the clouds of these invisible organisms, fixing

themselves on mucous surfaces, and such virulent epidemics as cholera?

E. The fact is, if I did not know to the contrary, I should be really tempted to say you were trying to make a fool of me. But what is implied by indestructibility?

R. It is certain that we cannot destroy Matter; we can alter its form, we can turn solids into fluids, and even into gases, metamorphose it, in fact; but, under one form or other, it is still there, it is never lost.

E. But is it for us to affirm *that what finite man cannot do or understand, no other intelligence or power can do or understand?*

R. That, at all events, is their version of their motto, *ex nihilo nihil fit*, and of which we might make a very free translation thus: —that neither God nor man can make *something* out of what *we* call *nothing*. But what! are *we* to make a stumbling block of Matter in God's path, or defy Him to do this or that? It is here I for one join issue. With me God's power must not be limited—*my* God must not only be infinite, *but all in all.* Man says, because *I* cannot understand or explain it, *this thing cannot be done;* but what is Man that He should be mindful of *him?* No Lucifer in impiety must hurl at

my God the scoff—"One thing there is—with all Thy might—Thou canst not do—Thou canst neither create nor un-create Matter. It defies Thee. It is a God even as Thou—for it is as Infinite! Here is a piece of Gold—Boaster, destroy it!"

E. Hush! you make my flesh creep. Tell me what evidence there is against this illimitable division theory.

R. The plain inferences are against it; for Dr. Dalton, of Manchester, detected a law which he called the Atomic Theory, by which particles will only unite chemically with each other in certain definite weights, proving that there may be, and probably is, an ultimate molecule which is absolutely indivisible. Since his time, Chemistry has advanced perhaps more than any other science, and his theory has been put to the test, by the shrewdest intellects in all parts of the world; but as it has stood this test we may regard it as now firmly established. Sir Isaac Newton had arrived at a similar conclusion. He says:—"God, in the beginning, formed Matter as a solid mass of hard, impenetrable particles, and these primitive particles being solids, are incomparably harder than any porous bodies compounded of

them; so very hard as never to wear or break in pieces; no ordinary power being able to divide what God made one in the first creation."

E. You must now tabulate Matter for me, if you please.

R. As far as I can make out, the propositions which have divided the world upon this fundamental question, are these:

1st. God existed in the Universe *alone;* but as what we have no capacity, being finite, of judging; and that He called Matter into existence or *created it by His Will.* That is the first proposition. If you won't have it this way, then,

2nd. God did *not create* Matter; and if He did not create it, as it could not produce itself, it must be eternal; and if it is eternal, it must be a part of God, or it must not. If it is *not*, but is merely used by Him—being eternal, He cannot destroy it; and so, He is not infinite, because there is something He cannot do. If it *is* a part of God, as it is solid and indestructible, what part of Him is it? Whichever part it is, we know that it is composed of so many elements, which we can handle and experiment upon in a thousand ways;—but can we imagine this

of a part of God? Scarcely. Let us try again.

3rd. Will you have it on Spinoza's plan, that there is neither a personal God nor a Revelation; because Matter itself is the *only* God? No;—Let us take, then,

4th. Plato's view; that God existed, and Matter existed from all eternity—God the Spirit and Lord, Matter the substance and slave; each separate and distinct, *but their mutual relations undefined.* That in the Creation, God united Himself with this Matter, moulding it, and binding it to His purposes—as He willed. In this case, the second proposition is left open.

5th. There is St. Paul's view. Now did he mean, when he was writing, to the Corinthians—ignorant as they were of Chemistry—not that Matter did not exist at all before the Creation, but, that in its original state, it was too tenuous to "*appear*" to the naked eye? Because there can be no question, that if he, or I, or you, had been present at the commencement of the creation of the world, it would have *seemed* to us as if created out of nothing. And here is another interesting query. When Paul said that it required *Faith* to understand how the worlds were

framed by the word of God, out of something which did not appear, did he only mean that the ignorant Corinthians required that faith, or did he intend his remark to apply to all time? *We* do not require faith, if we allow the previous existence of Matter, because we can, with our advanced knowledge, readily understand how it was—as you have seen. If we *do* require it, then it is clear that Paul meant that God, when He created the worlds, called such Matter into existence as was best suited to His purpose. Considering, therefore, every aspect of the question, this is the view I have adopted in my own mind, and which is really the first proposition. There I am quite content to leave it.

I have dwelt so particularly on this question of Matter, because many of the early fathers—even Justin Martyr himself—maintained that God created the world from an unorganized material which *existed previously;* and it is certain that many learned divines since his time have advocated the same view. Whether this Matter was of one kind only, and that, in the incandescence, it divided itself into isomeric elements which it is impossible for us to subdivide, we cannot say, but I think it not improbable.

As bearing very closely upon this question of Matter, one word must be said on the Meteoric stones, or falling stars, which occasionally cleave our atmosphere and strike the earth in showers, sometimes extending over 50,000 miles of its surface! The only difference between their constituents and the earth's is, that they contain an alloy of nickel and iron—the earthy matter being a kind of lava. They may have originated in three ways. 1st. From the already suggested destruction of some planetary body—and certainly they exist in immense numbers. 2nd. They may have been expelled from planetary or lunar volcanoes. 3rd. They may arise from the agglomeration of the small atoms floating in space.

They are corroborative: 1st. That one kind of Matter is common to the whole planetary system: 2nd. That particles of Matter, large or small, *do* float in space: 3rd. That these particles, probably more crowded near the Sun than in other parts, may give rise to the solar-spectrum colours by their combustion in the photosphere.

E. Do you know, I have often tried to picture to myself what took place at Creation!

R. I fancy it this way. If we were to see

a man in the open *air*—standing upon some pedestal—and after giving some portentous command, go through the action of moulding, say, a statue—and if, as he waved and interwaved his hands, we saw first, the faintest outline gradually solidifying into substance, until the perfect, hard, impenetrable mass of marble, stood revealed to us as a resisting figure—clearly defined—would it not have appeared to us, and should we not speak of it, as having been created out of *nothing?* And yet it would not have been so very wonderful after all, because the air contains a hundred kinds of Matter floating in it. So in creation; I *imagine* a transparent space; I then *see* the atoms of Matter at first sparsely diffused over a boundless area—coalescing closer and closer under the gravitating power given to them by God, and so ultimately growing in density as to assume, first a haze, then a film, then a fleecy, and then a denser cloud, until the pressure of the attraction diverging them from a straight line causing them to whirl, they pursue their future course as I have described. I want you to keep this picture in your remembrance, as it will help you more than you think.

E. I can readily do so from your description.

R. One more view, that you may see the question on all sides. All through the universe, all through the earth, all through the career of humanity on earth, there are continual ebbs and flows; swayings to and fro of joy and sorrow, rest and unrest, life and death. We have seen that the planets have been thrown off from the parent mass like buds, or off-shoots from a tree; why then, when the fruit is ripe, and the life (the heat) of the Sun begins to decline, should they not be recalled from their orbits, the central fire be re-fed, new combinations of Matter be fermented, and new worlds of ever-varying dimensions, and possessing ever-changing and ever-advancing wonders, be re-cast off? What would it all be, but the systole and diastole—the pulsatory throbbing of one out of the many myriads of hearts in the universe, the interval between the beats being longer or shorter in proportion to its occupation in space? Even under this view, God may just as truly act and supervise, as under any other.

E. No doubt; it is rather too pantheistic for me, however, and I prefer after all to

keep to the more scriptural view as the safest.

E. We have dealt with many phases of Matter, and I have seen that Vital Force may be only another name for Motive Force, acting on organized Matter; but I must now go with you into the more abstruse points connected with Mind.

R. And I will gladly explain to you my views, only requesting you to give them a fair consideration—knowing, as I well do, how they will clash with ordinarily received opinions. At the same time, I am quite willing to be judged by your ability to grasp the pictures I present to you of these mysterious problems, compared with the attempts of other writers. What I tell you may not be *new*—for that I care nothing; but one thing is *true;* viz. :—that it is the result of observations made at the bedside of disease, from many years careful watching and study; and I certainly say it, not only from independent reflection, but as a most determined opponent of all German mysticism and infidelity.

E. That is fair, at all events; and I, on my part, may tell you this :—that my ideas can

scarcely be in a state of greater confusion on these topics, than they are at present; so, at all events, you can do me no harm. The other day, to test myself before coming to see you, I took down a good encyclopædia (Blackie's), to look out "Imagination;" and you may condemn my wits or not, but the more I read it over, and the more I studied it, the less I understood it. The first part was pretty clear, but the latter part, where mind becomes soul, and soul mind—both inextricably confounded together—completely spoiled the effect of what had gone before. Let me but carry away with me something that will enable me to comprehend clearly the action of Mind, and I think I can forgive you anything.

R. I am by no means so sure of that; but I shall certainly test you. Now prepare yourself. I believe that as Vital is modified Motive or inorganic Force, so also is Nervous, so also is Ideal, or what we call Mental or Intellectual. *The inorganic force being simply and proportionately exalted by the exaltation of the organised tissue or matter—and the one keeping pace exactly with the other.*

E. Good Heavens! but I never thought you would go that far, though.

R. Hear me out, if you please.

1st. I regard the brain as a most subtile electric battery, or rather a battery by which some form of, or all the combinations of Electricity are blended into a still more subtile development—capable of preservation (memory); that the convolutions of the brain form and re-form, digest and re-digest ideas at the command of the individual, so long as the brain is supplied with suitable food, and so long as the instrument is sound and under the authority of the Will.

2nd. There is the Will (the telegraphic clerk who commands the instrument); there is the brain, and there are the nerves (the telegraphic apparatus and wires); there is the blood supplying the brain with food (acid and metal); and there are the ideas and thoughts given off (messages). Now, if the clerk is unsteady from any cause, or if the food is unsuitable, or if the instrument is imperfect, so, proportionately, will be the messages transmitted; while if the action of the instrument be interfered with (as in simple compression of the brain), or the supply of food is interrupted (fainting), the entire action will cease for the time being. If you *repair the instrument and re-supply the food, the functions will*

certainly return, but they will only return according to the perfection of the reparation. Note also well, that if the instrument is so damaged as to be irreparable, it neither will nor can act any more. It has done its work, and its function ceases for ever.

3rd. But supposing the instrument and food are perfect, and the telegraphic clerk, the controller and director (the Will) is absent as in sleep, what then? This: ideas are still formed just the same, because the instrument is supplied with food just the same; but instead of being marshalled in due order by this Will, they run into absolute riot, arranging and re-arranging, combining and recombining, or separating into distinct excursions of their own, and so presenting that incongruous, fastastic, and disordered web of fancies, which we call by the name of *dreams.* Dreams are really half-waking thoughts, uncontrolled by Will; and it is worthy of notice, as has been pointed out by Sir H. Holland, that the shades of forgotten or past dreams, where the consciousness wanders back, startled by some casual association, into an undefinable world of thought and feelings, will account for many supposed *presentiments* and *warnings*, commonly regarded as super-

natural. They are simply accidental coincidences of actual events with half-remembered dreams.

If you will kindly remember these similes as the first stage of the explanation, you will find it, as we go on, a very desirable help.

E. Allow me to take breath for a moment. The gist of this reasoning is, that Matter and its emanations may be much more subtile than we have hitherto had any idea of; and, remember, I shall call them in future emanations, under the vibration proviso you have made. That, commencing at platinum —the densest—we pass on through, say, granite, earth, air—the medium for sound; Ether—the medium for light and heat; an unknown medium for thought(?); and an immaterial medium for prayer. Is that so?

R. Exactly.

E. Again, that as the coarse acid, sulphuric, and the coarse metal, zinc, besides giving off hydrogen which escapes, give off also galvanic electrical currents as an emanation *from*, or *of*, crude Matter, the neutral sulphate of zinc resulting from the action, the formula (old style) being $Zn + HO, SO_3 = Zn, O, SO_3 + H$. So the changes in organic

elements, say phosphorus, in the organic brain battery, give off currents of thought or ideas, as still more subtile combinations of Matter.

R. Just so. We have seen that Electricity is a *force* and a tremendous one too, and we have seen that Solar light possesses a chemical ray which artificial light does not; may we not then rationally go a step further, and ask if Electricity may not still further subdivide itself, even beyond Magnetism, and whether there may not be a delicate ray which is not a *force*, but which may act as *nervous* through the medium of nerve tissue? Physiologists have long been puzzled with nervous force; it is as near Electricity as it can be, but it somehow stops short of it. I have told you that Quatrefages thought he had identified it as a correlative, so that you perceive there is at least reasonable ground for this theory. If his view should be corroborated by other investigators, all argument would of course be at an end.

E. To resume. You think then, as the result of your reflections, that sensation, volition, and thought, are as truly connected with Matter, to say the least of it, as Electricity is.

R. Just so.

E. That as there is no greater distinction between the *life* of a crystal and the lichen, than there is between the lichen and man, so there ought to be no greater wonder that Light, Heat, and Electricity, should spring from combinations of inorganic Matter, than that sensation and thought should do so from combinations of organic. In each case they are the psychological duals of materiality.

R. You have hit my meaning fully. Even one of our very greatest physiologists (Dr. Todd) has to confess, "We don't say that material changes give rise to mental actions, but rather that the changes of the immaterial Mind and those of the Vesicular Matter of the convolutions *are simultaneous.*" Now, I beg of you to analyse this statement, and see what a jumble this timidity causes. Why not have gone a step further, and got out of all difficulty by saying that Vesicular changes *did* give rise to mental actions? It is too great a stretch of fancy to believe that in every case the physical and psychological changes could be so wonderfully coincident: it is quite impossible to conceive such a thing.

E. Narrowed down to this issue, it does

seem an awkward problem, but you have yet to justify your theory; and the most serious objection to your argument is, that when a man dies, it follows naturally (on your view), that his thoughts and the combinations of thought—the Mind—die with him; because the Matter from which they emanated is dead or disorganised. In other words, that so long as the brain is supplied with *material* atoms by the blood from the physical food, and so long as the organ remains sound in all its parts, it will continue to give off ideas and no longer?

R. Just so, and I hope to satisfy you of it.

E. Leaving only that soul, or spirit-germ, which, being immaterial and, whatever its future may be, can never die. This is also, I presume, the distinctive difference between us and animals, the only bond which binds us to the hereafter? Have I stated it all fairly?

R. You have.

E. And do you mean to tell me that the intelligence of man is not *divine* also, and therefore not immortal? Do you mean to affirm that all the God-like powers of reason are to sink down into mere emanations of Matter, however subtilely it may be ar-

ranged? that Mind is not a something absolutely outside of Matter, and independent of it? Think of Shakspeare and Milton and Newton. Are all their records and achievements to be swept away, to be wiped off as by a wet sponge? I tell you it is too humbling; and it appears to me, besides, such a reckless waste, a useless prodigality! I declare, if I had detected where you were leading me, I should not have been quite so ready to follow.

R. Have you done? Good: then perhaps you will now listen to me. That our finite intellectual labours here on earth *will* leave an impress on that spiritual life hereafter, as fruits of a talent entrusted to us, who can doubt? It is perfectly reasonable and right that they should. But do not, pray, go into any rhapsodies about the "divinity" of this human reason until you have thought the subject carefully over. So, the finite *will* and *must* swell and flout its puny gifts against the Infinite which has bestowed them! Ha! ha! thinkest thou that He, the Lord of all the universes, wants the feeble lights of any earthly mortals? Is there anything they have, that he has not given? They serve His purpose, they are agents in

His hands, but their flickerings pass away before the brightness of His Majesty, as the animalcule in the water, or the mote in the sunbeam. Why, man, so far as mere intelligence and power are concerned, God *degrades* you before the diminutive ant and the despicable flea! They are infinitely your superiors. If you possessed *their* gifts — taking weight as a standard—you would no longer be human, but really God-like. And as for waste and prodigality, God glories in it. What! are you also, in your impertinence, going to teach *Him* economy? Why, He confounds and bewilders you with His riches; He crushes you with His magnificence; He is right royal in His extravagance! He throws away more animal and human life-germs by a hundred-fold than He uses. Nay, you need not stare so: it is a fact for all that. You and all your empty braggings, I tell you, are but as the dust under the driving-wheels of His chariot; and He makes it fifty chances to one—I might almost safely say a hundred—whether He will permit your life-germ to be vivified at all! It is well that you should recognise what your place is in His sight. As for the plant, he wastes, as *you* think, hundreds of thousands of

exquisitely shaped pollen-cells — the very essence of plant growth, where a few only are needful for His ends. He waves His hand, and, what *you* choose to call death and decay becomes steeped in wondrous forms; and He scatters in countless and unmeasured profusion, creations of surpassing beauty, in which, although the unaided eye perceives them not, the scientific sight revels as in a fairy-land of wonders! Oh! man, "Whose breath is in His nostrils, to whom indeed will ye liken God, or Who hath directed *His* spirit? Hath it not been told you from the beginning, It is He that sitteth upon the circle of the earth; and to Whom the inhabitants thereof are as grasshoppers? He stretcheth out the heavens as a curtain, and spreadeth them out as a tent to dwell in; He measures the waters in the hollow of His hand, and metes out heaven with a span, and comprehends the dust of the earth in a measure, and weighs the mountains in scales, and the hills in a balance! Behold! the nations are as a drop of a bucket, and are counted as the small dust. All *nations* before Him are as nothing; nay, they are counted to Him as *less than nothing*, and vanity!"

E. I will not call all this rhapsody in

return, because I can thoroughly appreciate your enthusiasm; but I must bring you back to argument, and imperatively demand some evidence to support your views.

R. Pardon me, if my indignation at Man's arrogance and presumption has so burst out; I will endeavour to control it more in future. Now, allow me to observe, that there are three sources of fallacy which have bewildered inquirers into the nature of the Mind.

1st. They too often regard it as coming into existence suddenly, and only in a fully-matured condition. They forget that it has been built up from its excessive weakness in infancy, by very slow accretions; that it has been fed by instruction and ripened by experience, just as the body has been by food and exercise. And as language is but the expression of ideas by sound, so you will observe, that not only the language of the child, but all languages grow from small beginnings and tread in the steps of their Master, the Mind. What is the untutored savage, but a child's mind, and *consequently* a child's language in a man's frame?

2nd. They only consider the Mind in its *healthy* state, ignoring all its revelations and teachings under the various forms of disease.

3rd. They will persist, with a dearly-fostered pride, in clothing both it and its productions with the mantle of immortality. The moment you once recognise there is body, mind, and soul, or spirit—each separate and distinct—that the body and mind which we have in common with animals perish together; and that the spirit or soul only, lives on in the future, the mist of many difficult questions falls from the eyes at once. And why should the Mind be immortal? Is there anything, when we look back over its action through life, to make us wish to carry it further? We may rely upon it, that God will not weigh our ability to write a creditable book, any more than our power to hold more than others at arm's length, or to walk a certain number of miles in an hour. These are not the standards of His measurement. The body and mind are imperfect types of the future, but that is all.

E. I don't like this animal conjunction, I tell you honestly.

R. It is all false pride. All that you can make of the natural man is, that he is an intellectual animal, and that when his soul-germ is quickened he becomes a spiritual one, and so rises into that perfection for which God

intended him. Until he achieves this, the difference between him and other creatures, however great he loves to think it, is as nothing in the eyes of the Almighty. There is but one bond between him and God, and it is not *life*, and it is not *mind;* it is the sympathetic union of spirit with spirit. You will hear it said, that God gave to Man life and intelligence, as if they were something peculiar to him alone. But has He not given life and intelligence to the little ants also? They have chiefs, magistrates, engineers, generals, and soldiers. They build palaces with corridors and staircases, with granaries and galleries; and they undertake wars, and capture slaves! And it is to my mind, at all events, equally clear, that unless they had some means not only of forming but of communicating ideas, their various labours could not be effected. Now there is the blind instinct (because uninstructed) of the bee, which makes and fixes its hexagonal cells the same as its ancestors have done, probably for hundreds of thousands of years; but in the case of the ant, or what you call the cunning of the fox, you can no longer call it blind instinct, but reason and *judgment*—another name for experience.

Why, if you take a score of spiders even, you will have half the trades in the country! There have been no end of discussions as to what is instinct and what is reason, and I think the time has fully come to revise our ideas as to their true nature. My definition is this: *When the external circumstances are ordinary and regular, there is instinct.* But when the circumstances change into *irregular, unforeseen,* and therefore *uncertain,* it is no longer instinct, but reason. Give it another name if that will satisfy you, and call it instinctive reason, limited to narrow circumstances, with the process of arriving at conclusions unrecognised; but there are scores of ways in which animals have been guided in complicated circumstances, either by reason or inspiration: for certainly blind instinct would never account for them. I hope no one will pass judgment upon this question until they study an account of the agricultural ants, by Dr. Lincecum, read before the Linnæan Society by Mr. Darwin, April 18th, 1861. These little creatures make gardens, as well as build complicated houses; they level the land, they root up weeds, they plant corn—even for next year's growth, they cut, gather, remove the chaff,

and store up the seed in granaries. Perhaps even more may be said of other varieties of ants, as the "Drivers." The theorist on the divinity and immortality of the intellect, is, therefore, in this dilemma: he must prove that the intelligence of the fox, the dog, or the ant, is not a modified form of that of man; or, if man's intellect is divine or immortal, he must show cause why theirs should not be also. It avails nothing either, to say that God gave the intelligence, and resumes it; because the same reasoning applies to every thing coming from Him. The question at issue is: *Whether this intelligence is associated with the identity of the individual in the future life?* So much then for the comparison of the mind, with that of brutes; and as for those of the body; as a flea can leap 200 times its own height (and it is pretty nearly as high as long), a man ought to spring at one bound 300 yards, or twice as high as St. Paul's cathedral!

E. Remind me that I ask you another question on this point, by-and-by; but you have advanced a view as to ideas being emanations of Matter, and I am sure you will excuse me, if I mean to press you a little closely upon the point.

R. And the more you press me, and the closer you follow what I say, the better I shall like it, I assure you; because I am just as earnestly seeking truth as you are. Well now, to begin with, you must confess that when you put the acid to the metal, currents of Electricity were given off, while a new product, the sulphate of zinc, resulted. Then supposing I tell you that after your day or two's hard intellectual labour, I can bring to you the phosphorus and the sulphur, arising from that wear and tear of brain, just as you might bring me the sulphates of zinc, or copper, as the result of that chemical union which had generated the Electrical currents; and *this, in direct proportion* to the amount of thought you had given off?

E. Do you really mean that? Because if you do, that looks, I confess, indisputable.

R. I have no more doubt of it, than of my existence. Dr. Bence Jones established the fact of the oxygenation of sulphur and phosphorus in brain-action, in the most beautiful manner, not only in health but in disease of that organ—as inflammation (see papers, in *Med. Times*, 1852). In the same way, as the muscles contain little phosphorus, but a great deal of sulphur, if you use

them violently, you consume sulphur, and give it off as chemical sulphates in an amount exactly proportionate to the degree of exercise. I believe we might measure the amount of muscular convulsion in disease in this way; and there is no doubt whatever, that if you came to spend a week of mental relaxation with me—wearing very little brain, but a great deal of muscle—when you returned to your intense intellectual labour, the effect would show itself immediately, in the chemical oxidation which would go on in the mineral constituents of the grey nervous matter of the brain convolutions; and you will not forget either, the curious analogy there is between phosphorus and sulphur as non-metalloids. Then why should not, as I have said, a peculiar subtile ray of Electricity be generated by these combined elements in the brain-battery, which we rank under the different varieties of nervous—the sulphates and phosphates resulting from the subtile organic chemical action of the process?

E. It is altogether one of the most curious and most startling facts I ever heard of; and that free phosphorus—a particularly inflammable substance, to begin with, should be

also combined with fat, as if it were specially prepared for combustion, is most singular. We may fitly speak of *luminous* ideas. But do not other parts of the body contain phosphorus, and is it possible there may be any error?

R. Certainly; but there is no error, I believe. Curiously enough, again, Dr. Beneke (Papers, *Lancet*, 1852) thinks he has established, that there can be no emaciation without escape of phosphates; but I am speaking of separate brain action, in a healthy state; and in all other parts of the body, phosphorus is fixed in neutral salts, whereas in the brain, it is kept free for its specific purpose. It would be just as rational to say that, because the bones contained phosphorus, we ought to *think* by them, as it would be to say that the seat of the mind was in the hair, because it also contained that element; and that when we presented a friend with a lock of our hair, we gave him at the same time a "piece of our Mind." Such arguments make a noble enquiry ridiculous.

Having then, I hope, made this first point clear, I proceed to another fact. Suppose you *shake* the brain, without any perceptible injury to structure—as in concussion; nay,

if part of the blood leaves the brain for an instant—as in fainting, what results? Why, that sensation and thought disappear as if by magic, and there is absolute insensibility or unconsciousness, though the less-exalted and coarser principle of life may remain. Or, take another case: say a man falls from a height, and a piece of skull simply *presses* upon the brain. In such a case the patient will continue insensible until the piece of bone is prised up by the operation of trephining. Now, no ideas can emanate in that condition, any more than a telegraphic message can pass when there is a defect in the instrument. But mark, in the moment of relief to the oppressed brain, the same train of thought continues to be given off as was in progress when the depression took place. Indeed, there is the best reason for believing that men have resumed the very sentence, the middle of which they were uttering at the time of the accident, though weeks of insensibility had intervened. If, therefore, the Mind is immortal and utterly independent of Matter, I have a plain question to ask you, and which will require all your consideration. If, while the brain was in a normal state, these faculties were there,

when the brain is in this abnormal state where did this thought and sensation go? What became of them? Had they some undefined existence, or were they, for the time, utterly extinguished? For it is childish to suppose that the difficulty is answered—it may be fenced for the moment—by saying that in this case, as in the most hopeless ones of organic disease, where the brain is virtually destroyed, they *were there*, but that we were *unconscious of their existence;* because, it will be seen, I think, as we pass on, that it is a bare assumption, and can have no real foundation to rest on.

E. I am beginning to be rather puzzled; it would certainly seem as if they depended entirely upon integrity of structure.

R. Don't be too hasty, however, in jumping to conclusions; that is not the way science is built up; we must go safely. Let me point out a third argument. In the previous cases the action was only temporarily interfered with; the structure was not damaged, and, as soon as the causes of interference were removed, *perfect action was resumed.* But suppose, now, that it *is* damaged—let us say, as in apoplexy, that a couple of teaspoonsful of blood have forced their way,

tearing up the material of the delicate organ —you will find that sensation and thought are at first suspended under the shock, and that when they rally, they only do so in exact proportion as the lesion is repaired, and the material resumes its integrity, or normal state, or health. All who have been unfortunate enough to have had a case of paralysis in their family will bear evidence of this. Then I have now to ask you where they did come back from?

E. I cannot say; but it seems extraordinary, nevertheless.

R. But allow me to put another case, because, remember, we are dealing with the problem as to whether Mind *not only has, but whether it can have, any existence apart from Matter?* Has it ever struck you to enquire what makes the lips red? Of course it is the blood, in the first instance, showing through the transparent covering. But what makes the blood red? Iron. So that if you were to get all the iron out of the blood, you would obtain about half a quarter of an ounce of it in a solid form. Now, I wish you to follow these facts, because they are very striking. When a man is in robust health, this iron is in its proper proportion; if it is

not, his lips are white, and he looks "washed out;" and you have no doubt seen girls look, from the same cause, of a deadly paleness (anæmia). Well, now, the part of the nervous system which is devoted to thought, ideas, and sensation, is of a grey colour, the telegraphic nerves (or wires) being white. Now this grey colour is found to vary, and to be connected with the red colour of the blood; and, in the case of the girl especially, where the blood and the grey colour are *both* too pale, there are the most extraordinary exhibitions of hysterical *nervousness*, so that the patient becomes an enigma to herself and everybody about her; she laughs when she should cry, is solemn when she should be merry, and silly when she should be sedate. If iron medicines are given (aided by fresh air and light), which replace the lost iron, and especially the phosphates, which may help to replace any deficient phosphorus as well, and restore the colour of the blood and of the *nervous cells*, all these eccentricities and irregularities of action disappear, and this *in exact proportion to the physical change in the physical condition of the brain.*

E. Upon my word you are working a

revolution in my ideas on this subject. That is a weighty argument if it be true.

R. It is not only perfectly true, but there is a word or two more. When the blood is poisoned by disease or by any other external agent, a man is said to *ramble*, or *wander*, or be *delirious* (dreams, as I have explained, are something different), or, as a common example, when he is half drunk, his ideas are, as they say, *mœudlin*. The drink has, in this case, poisoned the blood, which of course poisons, for the time being, the substance of the brain. But why should it poison the ideas? You must confess the brain is poisoned; but are not the ideas poisoned also? Tell me, are they not confused, eccentric, irregular, inconsequent; and all this just in proportion to the effect upon the brain? And does not the dissolute become *sober*, or his ideas become *steady*, as the poison passes out of the blood, and from the brain? Are they not intimately connected with, and dependent upon, the material structure of the brain? Whence come these strange coincidences, I ask you, if Mind is so independent of Matter, as the great physiologist I have alluded to would have us believe? If the brain does *not produce*

Mind, why should Mind show—like a barometer—such a wonderful sympathy with any material change? The fact is, it is only by the man's *drunken mind*, that you know he is drunk at all. And we may well ask, if Mind is so independent of Matter, why have a material organ for it to manifest itself through? See the mind of infancy, weak and feeble as the brain itself! Watch it grow as the brain grows, trace it through all its stages, up to its period of ripeness, and then its dwindling down into second childhood — almost to fatuity — exactly corresponding, in every step, to the condition of the material organ of which it is the reflection. In softening of the brain, particularly, you may watch—as I have done many and many a time—what you call this "God-like reason," fading away with the material—measuring indeed the one by the other, until you shall see that grand intellectual being who, when in his zenith, dazzled the whole earth by his genius, going down step by step, sinking slowly and fatally from his high eminence into little more than a mere vegetable, or sucking his food like a polyp only when it touches his lips. A pitiable object to boast of the divinity of his reason! Why,

even ignorant outsiders, who know nothing about these questions, talk at last of his Mind, poor *thing!* as being *completely gone!* But, I ask you, where?

E. And I ask you, where?

R. And I repeat what I have said, that when there is no injury to brain structure, and its action is merely temporarily interfered with—as in fainting, compression, concussion, &c., the battery ceases for the time to act; and that when these interferences are removed, it begins to act exactly where it left off, and I affirm that all experience tells us this is so. Where there is actual change of substance, the Mind is in accordance with that change. Even in cases of insanity, there are very few out of a hundred where the change in the brain itself is not clearly defined.

E. And what is there to be said on the other side?

R. If you were to take one man to the bed-side of a patient, whose brain was virtually a mass of soft pulp—with all its delicate organization destroyed, and who lay almost like a log—and ask him where the mind was, he would say, "Oh! I assure you the mind is there, unimpaired—the patient is merely

unconscious of it." Now I might just as reasonably declare a drunken man to be sober. How does he know the mind is there? Another will vary it and say, the mind is shut in and cannot manifest itself. To all such arguments I reply, give us *proof* —don't give us impudent assumptions; if you can prove me wrong, with regard to softening, or if you can make a man do, in that state, what he can do in a sound state, or if you can show me any evidence of a powerful mind, without the due proportion of brain, as in malformations, or of a great intellect without any or only half its proportion of phosphorus, I will believe you. But the truth is, it is a fallacy, and leads men into all sorts of inconsistences; for if Mind is *not* an emanation, and is *not* locked up in the brain, when so diseased, then God must take it and send it back again piecemeal, as the healthy state returns, or if it does not return, keep it:—which is simple nonsense. On the other hand, if the mind *is* shut or locked in anywhere, it must be in the brain; and in such a case it must remain shut in, and so can have no future. Let me give you one more illustration. Mind is just as much an emanation from, or of, the brain, as light is

from a candle; and the analogy is good all through. Now, if there is a defect in the wick, and the light goes out, do you say that the light is shut up in the wick, all the same? No; you say that the conditions are so changed in the material of the candle, that light can no longer be emitted. And as the light flickers and goes out, when there is no more material to consume, so does the mind flicker and go out in these cases of brain wastings. You can no more bring the brain back, than you can the candle; and you can no more bring the mind back, than you can the light; they began together, and they end together.

E. Then the result of it all, virtually is, that where there is a diseased brain, there is also a diseased mind.

R. Yes; though occult changes may occur, here and there, that we have not been able hitherto, to fully detect or explain.

E. I now want you to do me a great favour. I wish you to put me, in an understandible form, the different abstract properties, functions, or faculties of the brain. I have wandered through a variety of authors on the "Will," the "Understanding," &c.,

until I really have been almost dazed. If any one doubts it, let him go over Mr. Locke's Analysis (only) of Ideas, in his "Essay on the Human Understanding," and he will appreciate what I say.

R. I can scarcely help laughing at, and pitying you at the same time, for I also have been *there*, over and over again; and it seems to me that a lifetime would be required to grasp the fine distinctions which are made, and to ramble through all the speculations on this and kindred subjects. I wish to speak, I assure you, with all modesty and with every respect and deference to others. I shall merely present my views as likely to help you to understand what I believe to be the real action of the brain, and my definitions shall, at least, be brief, and, I hope, clear.

1st. The *Senses* are the inlets or channels to the brain. They are as so many feelers of a polyp, all *gathering* information or knowledge, as food, from the circumstances around them; some to be stored up or *remembered*, and some to be rejected as worthless, or forgotten.

2nd. The *Sensations* are the impressions, or associations, or feelings *giving* us in-

formation or knowledge of the external world around us, from the messages forwarded along the Senses, and all poured—if you will allow me the simile—into the brain-stomach as food.

3rd. *Thoughts*, *Ideas*, or *Imagination*, are well-digested past sensations, the mind being gradually built up by these, just as the physical structure grows, or is built up, by the digestion and assimilation of physical food.

4th. *Reflections* and *Deductions* are the cream of series of thoughts, distilled or digested, forming what we may term *conclusions* on any particular subject. The more of these conclusions a man has worked out by reading and reflection (study), the better *read*, or more *learned* he is said to be.

5th. The *Emotions*, whether of joy or grief, sorrow or anger, are all so many groups or bundles of thoughts arranged and classed together by *experience*, presenting at once so many pictures to the mind, and elevating or depressing it as they give pleasure or pain. These emotions are similar in most minds: what excites them in one, does so in many. Thus we say, "Had I been in your place, I should have felt angry, too;" or, "I feel so sorry for his grief" (sorrow); or, "I sym-

pathise with your happiness;" the same pictures or groups of thoughts being present in both minds. So it is that the shrewd orator or novelist, when he appeals to the emotions of the multitude, knows he is always sure of a response; because he strikes a chord which his own experience tells him will reverberate through every heart of his hearers or readers. It matters not whether the story is one of love, of hatred, of passion, of woe, of anguish, or of happiness, he touches our sympathies to the quick. The source of the interest we *feel* is because we merge our *self* in the incident pictured. How strange the difference in solving a logical or mathematical problem which is not a part of that *self*, and in which our life-experience can give us no help!

6th. The *Memory* is the great storehouse of the brain in which the digested sensations or thoughts, the conclusions and emotions of times gone by, are put away in due order; and it is a curious circumstance, that in old age or disease (softening, say), when the memory is failing, the thoughts and groups of thoughts longest put by are the best remembered.

7th. The *Mind* is the sum total and com-

bined action of the separate sensations, thoughts, &c., *acquired from infancy onwards.* The convolutions of the brain have also the faculty of weaving, separating, and re-grouping or re-digesting (creating) them into different pictures or images at will, as the child does from his six-sided picture-blocks, just as a few colours in the kaleidoscope assume endless combinations, and as the same number of atoms in chemistry form a score of diverse bodies. Again, when Mind communicates with Mind, what is it but an interchange of those acquisitions, thoughts, or conclusions which each mind has culled for itself? If you ask how the Mind can do this, I can only reply, that it is the function of the brain-cells, and of the convolutions, to do it, as it is of the lung-cells to act as chemists, giving off and taking in gases; of stomach-cells to produce a marvellous solvent; or of liver or kidney-cells to secrete or withdraw poisonous and used-up materials from the blood. To my mind, one is just as wonderful as the other, and we know really as much about the one as the other. We can only positively say that they do it.

8th. The *Will* is a power added by the

Creator to Man and animals, as Gravitation was added to Matter, to sway, or direct, or gravitate this Mind to the voluntary purposes of the individual. But, remember, at the confines of the Mind—so to speak—the two seem to be just as inextricably mixed and confused, and just as mutually affect each other, as do the colours in the prismatic ray. The influence of the Mind on the Will, and that of the Will on the Mind, have always been prolific stumbling-blocks with philosophers. You may simplify it, and looking at it in a general sense, this way; that in health, the Will is master of, and guides, and influences the Mind, and that in disease the conditions are reversed, and the Will becomes the slave of the Mind. When I have been sitting at the bedside of a delirious patient—especially one suffering from *delirium tremens*, where every effort possible was made to do himself a fatal mischief—the reflection has often forced itself upon me, how evil and disease are utter subversions of God's good providence.

9th. *Volition*, whether of mind or body, is the Will in action, just as creating is God acting. Thus, if "I give my mind," as they say, to a certain study, it means that I "will,"

or bend, or sway, the sum total of the whole combined brain action and experience in one given direction; just as pressure on some elastic fluid forces it this way or that way at pleasure. If I "will" to take a certain walk, I bend, or sway, the muscular powers of the body, to undertake that particular series of muscular actions.

E. I can readily retain all these views, and I think it is infinitely preferable to take some simple one (even if we are not quite sure of its being strictly accurate), which leaves a distinct and indelible impression upon the mind, than to involve it in a muddle from which we can see no outlet. I also make every allowance for the deeply mysterious intricacies of the subject, and the difficulty there is to place them to another mind in a simple and common-sense form. I should, however, if you have no objection, wish to hear a little more about *Will* and *Memory.*

R. The wisest illustration I can give you of combined Will and Mind, is as follows: I am undecided which of two friends to visit; one an old friend of my father and grandfather, and much commended to me by them as holy, just, and good; the other

plausible, genial, and a general favourite of the world, but of whose vices I have been fully warned. I picture the good and the evil of each home; the calm peace and satisfaction of the one, and the wild but fascinating riot of the other. There is no conceivable aspect of the question which the Mind does not weigh and consider, while Conscience, like Mentor to Telemachus, thrusts itself into the debate, and argues sternly as to the purity of the happiness in the former, the delusive pleasure in the latter, and the certain consequences of both. I am now left to my own Freewill to decide, and I shall certainly go as that Will has been trained or biased in its likings or dislikings.

Here the Mind is clearly blended with the Will, and what I do is a combined act; but too often the Will bends the Mind towards the evil, and snubs the Mentor when it puts in a plea, allowing neither a calm nor fair share in the debate or the transaction. In fact, the conscience, unheeded, may have protested during both. On the other hand, a drunkard *will* drink, or wills to drink, as they say, against the dictates both of Reason and Conscience, until the consci-

ence ceases to protest any longer, and we say, "He has no conscience left."

E. I understand the double meaning of your illustration; and now for Memory, which seems to me the most interesting as well as the most astonishing of all our gifts or faculties.

R. I scarcely think it is more astonishing than that (on the old view, and which I can't yet help thinking is the true one) a piece of cold iron should possess within it a host of agents imperceptible to our senses, and yet possessed of such marvellous force when called into action. That Light, Heat, and Electricity should all lie hid in the pores of the metal until some power calls them forth, or that we can store up electricity in the Leyden jar just as if it were so much water or gas, seems to me quite as wonderful in its way as that thoughts or ideas should lie hid in the cells of the brain until the power of the Will calls *them* forth; and that *both* should return to their places when the action of the power which called them out ceases. I will tell you all which I believe we know. In *health*, when the Will seeks in these inner chambers it can bring forth those very thoughts—nay, whole ranges of thought—

which had been formed and parcelled years ago, though forgotten in the meantime. And more; we find that if this warehouse is destroyed by incurable apoplexy, or softening, the goods there contained are *utterly lost;* the memory has *gone;* while in delirium or mania, where the regularity or order of health is cast aside, these chambers of Memory or Imagery are forcibly entered, and all the myriads of parcels of thoughts are rifled from their cupboards, and tossed about and jumbled together, in the wildest riot, confusion, and disorder. This disorder in its worst and most persistent forms we call *madness*, and in its milder or temporary forms, *delirium*, or *wandering*, or *rambling*. On the other hand, where structure is perfectly sound, when from some temporary cause the connection with these chambers is interrupted—and the only wonder, in so delicate an organization, is that it is not oftener—we say the man has *lost his memory;* and when, in some mysterious way, the communications have been re-opened, we speak of it as having *come back*. But you must really carefully observe once more, that neither Mind nor Memory ever come back if the structure has *gone* too.

E. Thank you very much. If I may interrupt you for a moment, I wish now to make a few observations on my own account.

R. In an instant. I wish to remind you, that for the growth of Mind, two things are necessary :—

1st. That sensations should be admitted and retained; for if they are not admitted, or are not retained (as seems to be the case, for instance, in the clownish boor), how can the Mind grow ?

2nd. To digest these sensations, which are the origin of the ideas, thoughts, and the imagination,—by reflection, by assimilating them into sound deductions, parcelling and docketing them as Memory, and maturing them into the full ripeness of judgment, by the experience derived from similar groups of sensations.

Now for your statement.

E. For the first time in my life—and still more after your last remarks—there is dawning on my mind, the solution of a problem which has puzzled me perhaps oftener than any, and which I know has puzzled many other people besides. I will illustrate what I mean by a *bonâ fide* example. The other day I was very desirous of putting an ab-

struse question, about which there is a great variety of learned opinions, in such a manner that,

1st. I might save others the labour of wading through the wearisome obscurities which surrounded it; and,

2nd. That I might present it in a novel form, to be the more readily grasped and understood.

I carefully re-considered some observations which I myself had formerly noted upon the same question, but finding that I still needed much information on many points, I examined what other authors had said concerning it, referring first to one, then to another, making jottings here, and annotations there, until I believed I had all the facts I required for my purpose. After much brooding, pondering, and reflecting, I essayed to put down in writing, the conclusions at which I fancied I had arrived. To my great disgust, they were both ill-digested and unsatisfactory. I got up from the desk, walked about the room, putting it this way and that way. I wandered into the garden, reviewing all the phases of the matter from beginning to end, earning for myself, it is more than probable, the title of being "addled,"—as

men are said to be when they cannot give expression to, or find an outlet for, the combination of thoughts of which they are labouring; but, do as I would, the ideas—which I had all the while a consciousness were forming themselves somewhere—would not settle into their places as I wished. I had almost despaired of making anything out of it, when, in the quiet of the night, just before going to bed, suddenly, like a revelation, I caught the key of the position, the whole question opened out like a vision, and plainly defined thoughts—clear and sharp—came crowding into my mind faster than I could fix them down. To my astonishment also, when I came to read it over, the whole product seemed to be so original and so diverse, that I could scarcely recognise the ideas or the language in which they were wrapt.

R. The illustration you have given is *one of the supremest importance*, because the process, which I think you have very accurately described, is the one which takes place in every mind, whether it is exercising its own special gifts—as those of poetry or mathematics—whether it is *analytically* unravelling tangled skeins of thought, or *synthetically* recording its views upon any widely-disputed

point. You will therefore excuse me, I hope, if I examine it somewhat closely. I shall make it more simple, perhaps, by giving you a few familiar examples, each advancing in complication.

1st. If you put cream into a churn—the cream you will not forget having been digested from the milk—and churn it for a certain period, longer or shorter, according to circumstances, you obtain at last a product (and you can tell that it *is* forming before the process is completed) very different from that with which you started.

2nd. If you send raw cotton or wool to the manufactory, it is separated, weeded, combed, spun, woven, dyed, printed, pressed, and folded, until you could scarcely recognise the beautiful fabric as being of the same material as that which you had forwarded.

3rd. If you have an appetite for food, you heap upon your plate a variety of compound bodies—the results of other digestions—such as meat, potatoes, and bread, and you go on adding other varieties of food, until you feel you have taken sufficient for the occasion. The food is broken up by the teeth, dissolved by the gastric juice, and when it has been duly separated from the innutritious

and useless parts, it is purified and concentrated by the glands, and ultimately as a glassful, say, of a creamy-looking liquid called "chyle," is admitted into the blood, just behind the collar-bone, to replenish it and nourish the body. If you considered the *olla podrida* you had put into your stomach a little while before, and if you could see the essence into which it has since resolved itself, I think no one would be more surprised at the results of your own digestion than you would yourself.

4th. I am not sure that the best example of all, is not the leaven or yeast which you put into the wort. Let the wort represent the undefined thoughts of your mind; the material is there, but the change in its relations whereby the new product is to be fermented has not occurred. Let the Will be as the yeast which induces that catalytic change in the atomic re-arrangement of these thoughts which by reflection or digestion are concentrated into final conclusions, just as the alcohol or essential spirit is obtained by distillation when the fermentation of the wort is complete.

E. I must be very blind indeed not to see what is coming next.

R. But let us analyse your proceedings minutely, that you may have clear views upon this problem in future, (I shall be only too glad if any one can make them clearer for you). And the first point I wish to impress upon you is—because it confirms my previous suggestions as to thought being an emanation of matter, that *you must have materials of which to form your thoughts;* you can no more make ideas out of *nothing*, than the sculptor can make a statue without marble or tools, than you can make butter without cream, cloth without cotton, or chyle without food. *Thus, there can be no thought without previous sensations, and no sensations unless Matter has existed in some form or other to originate them;* and I defy you or any one else to disprove this. I know that thoughtless men talk about self-this, and self-that, but it is only because they have not reasoned these things out from the foundation for themselves. I will give you an instance which is better than a hundred arguments and a thousand baseless assumptions. Cheselden, the great surgeon, admitted light into the eyes of an intelligent young man, over 20 years of age, who had been born blind. When his vision was declared to be

perfect, he could not, by any innate reasoning, as it is termed, of his own, or by the arguments of his friends, "reason" out what bodies were *round* and what *square*, until he felt them with his *fingers;* proving, if anything can prove, that true perception is the result of education of the sensations. Suppose, then, a child to be born blind and deaf, and having neither touch, taste, nor smell—that is all the senses communicating with the external world *closed;* does any body mean to say that if such a child lived for 20 years it could form any ideas *innately*, of *itself*, any more than a dead log could ?—because this is really the question at issue. Cheselden's case proved distinctly that it could not, and to my mind puts an end to the dispute; of course the result would be just the same (as I have shown you in softening) if, while the senses themselves were perfect, *there was no brain at their extremities to receive and retain these impressions.* Having thus made a clear course, let us go on. The brain, then, is the churn, the manufactory, the laboratory or stomach, and the brewhouse, as well as the ware or store-house of thoughts or ideas arising from those crude sensations, which have been poured into it in times past.

Thus, you had an appetite for a certain kind of thought. You put food into your brain, some of which food it appears you had already in your possession, but also these digested sensations or thoughts which other minds had recorded. Then, you *willed* to *think*, that is, to put in the leaven—to dissect, to dissolve, to mix, to reject, to purify or eliminate, and to assimilate all this various ideal food into a new or elaborate product, which should be as some distilled essence, or chyle, by which other minds should be nourished. Nay, comical as it may appear, just as the butter makes that peculiar noise which tells the dairy-maid that it is ready; or as a bell may sound in the manufactory that the goods are fit for delivery; or as a feeling may impress itself that digestion is completed, or when, as we say, fermentation has ceased; so do we seem to receive some intimation that our ideas upon the *study* are matured, and that they may now be fixed. And so, while in chemistry you see the *same* number of particles of the *same* substances arranging and re-arranging themselves isomerically or polymerically into the most divergent forms—now as gases, now as fluids, now as solids; now sweet, now sour, and

now bitter; now as life-destroying poisons, now as life-restoring antidotes:—so, the *self-same sensations*, received in different brains, assume a different hue or complexion according to the special *idea-manufactory* of the individual.

And thus it is that the poet and the true painter, with a keener and more sympathetic appreciation, say, of the lovely landscape before them, weave therefrom those romantic webs of imagery which so delight our fancies, and which the uninitiated regard almost as inspirations. I believe the secret is, that these gifted people have an isomeric and polymeric power of arranging and re-arranging a few simple ideas into new forms of enchanting beauty, with an ever-changing kaleidoscopic variety. This prolific idealization, this fertile or vivid imagination, is sometimes so intense as to verge very closely, in its unnaturalness and wildness, upon mania. I may illustrate this remark by the poems and tales of Edgar Poe, and the paintings of John Martin. But at the same time—however distorted the idea of the whole conception or composition may be, if you will patiently dissect or disjoint the details of the wildest poem or picture—and it is capital

exercise—you will find, I think, no difficulty in detecting the origin of each. It is the magnificence of the whole which allures the mind from a detailed analysis. There is no constituent of the scene whether it may be horns, fire, cataracts, fiends or angels, heaven or hell (compounds), colour, varieties of light or shade, animals or men in every form of incongruity, *which may not be referred to something seen or read of.* And there are few minds, however unimaginative — where there is also some artistic skill—which may not by disjointing ideas and compounding them anew, produce amusing extravagances without end. We may take as classical examples of this process, the well known Medusa's and Hydra heads, the Centaurs, and the Mermaids.

E. I like your simile of digestion, because it explains to me many expressions in common use. Thus, if a man states his conclusions from half digested ideal food, he is quickly told that "he hasn't half thought it over." Another man will observe; "I can't say *yet*, I must *turn it over again* in my mind;" or, "I haven't *quite made up my mind;*" or, "I can't decide as to the best plan, *until I have had more time for reflection.*"

R. Yes; and so when the digestion is completed you will hear a man say; "It *has come into*, or, it *has crossed*, or, it *has passed through* my mind;" or, "the conclusion *I have arrived* at;" or, "it *has just struck* me;" or, "on reflection (re-digesting either old or new thoughts, or combinations of thoughts), I *have altered my mind;*" or, "at first I could make neither head nor tail of the thing, but on pondering it over (pounding it) quietly, it all *rushed into* my mind, and I saw the whole thing, sir, as plainly as I see you just this moment." You will see men even imitating the suddenness of their "seeing," by snapping their fingers, or smacking their legs in illustration—as if the process had been sharp as a pistol-shot. But now, once again. What rushed into his mind, and what did he see? He saw the details of this mental digestion coming in one by one and limning themselves as a picture, with (and vox populi is often, let me say, vox dei,) his *mind's eye.* So also, a man of weak ideal digestion, getting his thoughts upon any topic into a perfect maze, goes to a strong-minded or clear-headed friend, and tells him his round-about story. The friend says nothing; he listens patiently, he absorbs all the raw material, he

separates the useless chaff, he arranges the tangled threads—untying a knot here and there as he goes along—and almost before his muddled friend has completed his narrative, he presents to him the chyle, or the butter, or the highly finished cloth, or the essence, for him to take home, and lose himself in raptures at the wonderful cleverness of his sharp-sighted friend. And so, other strangely endowed men, lifting themselves high above the little individualities which surround them, soaring like eagles above their fellows, and casting also like eagles their piercing glances over the prominent minds in the neighbouring nations—gathering all their different threads of motives, longings, aims, divisions, sources of strength and weakness, checks and counter-checks—weave therefrom either a web of policy or a prophecy, according as they are born statesmen or seers; but of which the molish minds about them may have no dream.

E. That is so.

R. Yes; and note another fact. Plato likened the memory to hard plates of wax in some, in others to soft ones; some *remembering* things, or retaining sensations and thoughts more easily than others. Now you

may take it for granted, as a rule, that when it is found difficult, as they say, "to get anything into a man's head," it is generally as difficult to get it out; and *vice versâ*.

A man of this kind who has analysed some question in all its phases, and put away his conclusions thereon in memory, will not easily go through the same process again. "No," he says, "I have settled that matter *finally*, and all you can say won't turn me." He means, "I have arranged all the thoughts on that subject into a bundle, and put it carefully by; I won't seek for it, undo it, examine every thought over again, or be at the trouble of taking some out, and of putting others in; I remember the label, and that is sufficient; *my conclusion is formed*, or *my mind is made up*."

E. If mental labour induces some waste of particles of the brain substance, that explains the mischief of over-working the brain?

R. Yes; you mean really that you have forced the brain to produce more thought and faster than in a healthy way it can be supplied with inorganic materials for that thought, and which can only be slowly replaced. Remember that the phosphorus in

the brain is free and not combined with the oxide of a metal, as a phosphate of Soda, Potash, or Magnesia. If you persist in taking more money out of the bank than you put in, you must come after a time to a full stop. If, in overforcing of crops, you exhaust the particles of Matter in the soil which are assimilated by those crops, you impoverish the land; and you have to bone it, or lime it, or let it lie fallow for a time, until they are reproduced. So, in an overwrought brain the particles are not only more or less exhausted, but the contractility and tonicity of the coats of the blood-vessels from the continuous pressure are impaired—the owner being sometimes half-imbecile; and long rest, freedom from care and anxiety, and travel, are required for its restoration; and you will please to note that this restoration manifests itself—not in the physical condition, because *that* you can't see while the patient is alive—but in *the stronger mind.* When a man over-works his brain in this way (as alas! sadly too many of us are doing now-a-days—witness the "Lunacy Returns"), he may be said "to burn the candle at both ends."

E. You will hear people say sometimes,

"I will sleep on it." I remember a man once saying to me, "If I have any knotty point to work out about my business, I can do it best in bed." What is meant in these cases?

R. It seems that in the stillness and darkness of the night, and the more thorough exclusion of abstractions, the mind can better concentrate itself upon the points at issue; but it means also that the blood is passing more peaceably through the brain, inducing calmer and less flurried thought. I am not sure even that in daily study, thought may not be somewhat aided by changing the position of the head—walking about, lying down, leaning back, resting it first on one hand, then on another, thus causing local changes, probably, in the circulation. I say this not lightly, but on the experience of men well qualified to judge.

E. Talking of sleep; does it not sometimes happen that consistent and acute mental action occurs in dreams? I think I have read of Tartini composing his Sonata del Diavolo in a dream, in which the devil challenged him to a trial of skill on the violin.

R. It is true enough. When the train of thought in a dream is very intense, it seems

to rule both the Mind and the Will. Not being confined to the intellectual faculties alone, it raises the muscles to action, and a person walks, or performs the most wonderful feats while asleep—only remembering afterwards that he has dreamed. One of the best and most interesting instances I know of, is this. A distinguished Scotch lawyer had been consulted respecting a case of much difficulty and great importance, and which he had been studying with intense anxiety and attention. After several days had been occupied in this manner, he was observed by his wife, to rise from his bed in the middle of the night, and go to a writing-desk which stood in the bedroom. He then sat down, wrote a long paper and returned to his bed. In the morning he told his wife that he had had a most interesting dream. That he had dreamt of delivering a most clear and luminous opinion respecting a case which had perplexed him exceedingly, and that he would give anything to recover the train of thought and reasoning, which had passed before him in his dream. She then directed him to the writing-desk, where he found the opinion fully and clearly written out, and which afterwards gained the cause of his

client. This case is doubly interesting, because it illustrates how digestion had come to the full—even in sleep, the result been recorded, and forgotten in the waking moments. Such coincidences concerning events occurring at critical periods of men's lives, are often regarded as having had a supernatural origin.

E. That is very easily understood. There is another point I have jotted down here to ask you about; How is it we have to pore so over puzzles, problems in chess, or in mathematics, before we can solve them?

R. In mechanics there is a well known law, that *what you gain in power, you lose in speed;* and *vice versâ.* You can no more get power out of nothing, than you can get ideas out of nothing. If you desire to concentrate power, you must pay for it in some form or other. For instance, you must lift the water into the high cisterns at the Crystal Palace, before the great fountains can play a certain height; and *their* force will exactly correspond with that force which has been expended in raising the fluid. On the other hand, if you will be content to sacrifice power, you will have the exact equivalent in speed. Steam is a great power; but you

must consume so much material—coal (force or *heat* in another form)—to obtain it. Electricity is a *power;* but it must be compensated for by something: so Mind—in exactly the same way as muscle is—is a *force,* and must be paid for by the consumption of so much phosphatic fat. When people talk of students burning the "midnight oil," their simile is very much truer than they ever imagine. All the cases you mention, are *ideal force* in a compound form; and I believe, if we could measure it, as much force is needed to fix it in that form as to lose it. Thus, if it took Euclid, with his well-trained and gifted mind, two days to calculate a proposition, it may take another man—ten times less gifted or less trained, twenty days to solve it; and so there may be as much force locked up in six lines as in six volumes.

E. That sounds perfectly reasonable, I must allow.

R. Again it is a very remarkable fact, as I think was clearly proved by some experiments in America, that heat, which is "*force,*" *is an invariable and proportionate accompaniment of the exercise of thought:* the most delicate heat measurers showed this with unmistakable clearness. Whether this heat

is altogether owing to increased activity in the circulation, or some of it is due to phosphoric combustion, I cannot say; but it is certain that when a man is working his brain over hard, this organ gets proportionately hot, much more blood than ought circulates through it in a given time (witness also his cold feet), the engine is kept too continuously at high pressure, weighty thoughts are passing off constantly, coals are heaped on the brain fire, the safety valve is tied down, and not unfrequently, as the result of it all, the boiler and pipes are strained for ever, or the "golden bowl" may be absolutely "broken," and a shock of paralysis take place. Sometimes, short of this, slow, lingering, organic change results. I believe the emotions are still more exhaustive; and after severe anxieties you will frequently hear people say that, "their heads have never been right since." These are, of course, only occasional strains, allowing long intervals perhaps for repair; but I believe that the peculiar, continued jarring of the brain and nerves—that teasing or "nattering" which distracts the mind by constantly breaking in upon its steady action, incessantly driving the current of thoughts this way and that, and which we

describe by the word "worry," or an anxious form of it as "suspense '—though less manifest in their effects, are the most wearing of all.

E. But I wish to enquire what is the special use of this college discipline or scholastic labour ?

R. The value of mental training, in moderation, to unlock these concentrations of ideal force, is that it enables the mind to marshal all its powers upon any one given point. Thus a practised debater bringing all his intellectual energy to bear upon the ill-arranged arguments of his opponent, comes down upon him as with a sledge-hammer or a battering-ram, breaking up at one blow all his weak defences ; exactly as Napoleon did under the same system of warfare. He bent or swayed, as we do the mind, the whole of his military force against the centre of his extended enemy, splitting him into fragments, and beating him in detail—a system which the genius of Moreau and Wellington, almost alone of his many adversaries, detected and baffled.

E. Do you know I feel awfully tempted to try your patience. An idea has passed

across my mind, but it seems so utterly outrageous that I am afraid ninety-nine out of every hundred would think any one mad who dared to propose it.

R. Don't be afraid of stating it, I beg; and make it for this once as *outrageous as you can.* As for the 99, if you made it 999 out of a thousand who really do think now-a-days, you would be nearer the mark. So, that does not go for very much.

E. I don't care for what *they* think, it is what you may.

R. Ease your mind. Let me tell you from personal experience, that every enquirer into the works of God should consider this as a postulate :—*that the very wildest dream of the very wildest brain, will be always exceeded by the wonders of creation.* Now then for your idea.

E. It is, that in spite of the difficulties as to polarization, &c., it may still be that Light and Heat are really Matter, and not a change or property, communicated by a vibrating ether. Now, you believe that ideas are of a similar nature to Electricity. Some of these ideas you say are stored up, and some are forgotten; but what becomes of *them?* Where is the limbo of forgotten thoughts?

They have been formed—that is certain; but where have they gone to? Now confess if it is not a preposterous idea?

R. Not at all, I assure you. It is not only a very proper one, but it is a very logical one also. If ideas *are* of the nature of Electricity, it might be suggested that they would merge into the great sea of that fluid which covers the surface of the earth. If they were actually material particles, as you are imagining light may be, I may be no more able to tell you than I can, what becomes of the unabsorbed rays of the sun under the *same* supposition. But this I can do, I can cap your question by an appendix and put the whole as a proposition, thus :—

The broken up, disjointed, forgotten, or unabsorbed thoughts of humanity become food for, being absorbed by, higher intelligences.

Is that wild enough for you, or can you well imagine it to be more so?

E. It seems to me the most absurd proposition I ever heard in my life.

R. I am glad to hear you say so. Now, of course, the 999 persons would think us both childish, for discussing such an idea for a moment; but then they have probably never thought of these things in their lives,

or had any wrestlings or falls with Infinity, to teach them humility and wisdom. If you asked these very people what became of the poisonous particles of their bodies which escaped in their breath, they would think the question just as monstrous; and would be amazed to find that what they have done with, and cast out as useless, the plant seizes and breathes in by its leaves; and what it again gives out as done with, they breathe on as life-giving, by those very lungs which had cast out their poison, as food for the plant.

E. I never thought of that!

R. Pooh! that is a very small matter indeed. Ask the people in London who live upon the great chalk basin—one of those great deposits which form so large a portion of the crust of the Earth, the Andes for instance, what these deposits are made of? And the same proportion of people would say; "You must be out of your head to ask such a question: why limestone and chalk to be sure!" But what would they say if you showed them, aye, proved it to them, that most of these deposits were built up by the shelly coverings of animalcules, some of the varieties of which are so small that 186 millions, weigh only a grain, and 93,000

millions, a single ounce—the 16th part of a pound? Let me add, also, that many of them—as the Foraminifera, especially those from Barbadoes, minute as they are—are of the most marvellous grace and beauty. Far from quarrelling with your fancy, therefore, I am delighted you have given me an opportunity of showing you how the most far-fetched idea which man can entertain, will always be more than mated in the works of nature. For, is our proposition, as it stands, any more monstrous than the compensatory balance between the animal and the vegetable? Is it half as monstrous, as the fossilized animalcules I have mentioned? Is it one tenth part as monstrous as that you can lift up a hundred millions of creatures on the point of a needle—if you can do that, what cannot you do? or that you can encircle the same number by the smallest champagne-bubble? Is it one twentieth part as monstrous that you yourself should spring from a speck less than a champagne-bubble; or one fiftieth part as monstrous that in that speck there should lurk, like a cobra, a deadly cancer atom, which should lie perdu for half a century, and then suddenly spring up and make your home—and perhaps many

other homes—desolate? Nay, I will go further still, and ask you, if it is a hundredth part as monstrous as that, by a mysterious destiny, it should leap over the germ-cell in your child, and appear in all its malignity in that of your grand-child?

E. Fools, fools, that we are! Pardon me; I asked my question as one of the purest speculation, little dreaming of receiving a lesson which will make me more thoughtful in future.

R. And I indulged it also as the wildest speculation, *for once*, in order to teach you this lesson; but we have quite enough to do with what rests on sound bases, and must now keep, if you please, to safer tracks.

E. Returning then to our legitimate enquiries, it appears that when the mind is in a sound state and in a sound body, it is under the control of the Will; but that in disease, the Mind may drive the Will to be the actual destruction of that body which it should guide—as we see in delirium tremens, for example.

R. Certainly.

E. Now it strikes me to ask you, whether all the nervous forces are under this control?

R. No; happily for man, there are some varieties of nervous force in the same body which are quite independent of the Will, and are almost independent of the brain; though they, too, aid in the formation of Mind, by duly recording sensations; and I cannot give you a greater proof of a superintending providence—and consequently a greater back-fall for the Infidel, which of course have been my aims all through this enquiry—than by explaining to you, very briefly, the way in which these operate.

E. At all events, you can scarcely please me better.

R. First, then, there is an instinctive reflex nervous action, discovered by Dr. Marshall Hall—altogether independent of brain and Will. If I touch a hot iron, the sensation passes in the first instance, to a little mass or brain of nervous matter at the posterior part of the spinal column; and this small, or sub-brain, has authority to reflect the message from the anterior column, at once, along the nerves to their servants, the muscles, to withdraw the finger or hand from contact with the offending body. The space of time is inappreciable between touching a sharp point, and removing that touch; yet

in that space, or no space, the sensation has travelled along one set of nerves, up the arm to the spinal-cord, and has come back along another set of nerves to the group of voluntary muscles.

E. This provision sounds, it seems to me, rather a difficult problem for the Infidel.

R. Yes, but there is one still more difficult for him ; because there is a third nervous system in the body, also absolutely independent of the Will—that ganglionic system of which the solar-plexus near the stomach is the centre, and which controls and regulates the manufacturing department and the forcing engine, so to speak, of the body (the heart), viz., the digestion, respiration, and circulation. And you will see at once the wisdom which has preserved all these vital organs safe from the capricious Will of the individual, which might destroy or spoil in a hundred ways, the delicate machinery. If, indeed, it were not so, any freak of the perverted Will, might at any moment stop the heart, and death result.

E. What a marvellous arrangement! For the risk of harm seems not only provided against, but is positively taken out of the power of the owner himself to commit it. I

consider this fact insurmountable. To provide against externals is one thing, but to have to protect the Being against an enemy which is a part of the *self*, is a thrust which does not leave much hope for our antagonists. But to continue: are these three systems unconnected with each other as well as independent?

R. No, that would never do; for while in the first case, the little brain in the spine has the instinctive power of action in case of *immediate danger* or pressing emergency, the sensation itself is also telegraphed at the same moment to the head telegraph office in the sensorium, at the base of the brain, that it may be duly submitted to the council chamber of reason in that organ influencing the Will. Thus, when you removed your finger from the sharp point, that was action in the spine; but the combined movements which removed the whole body from the threatened danger, was action in the brain. These messages from the different sentinels who keep guard, the senses, go on all the day long with the utmost rapidity; until at last the clerks in the head-office become so over-wrought that, they first record them confusedly, next they begin to nod over their

work, and lastly, they sink into utter insensibility and sleep ensues. Even the very sentinels themselves, usually so watchful, are thrown off their guard, and partake to a great extent in the general torpor. The difference between this insensibility and that from other causes—whether compression, concussion, effusion on the brain, or poisons—is that, in sleep, the action is uninterfered with, as we see by dreaming, and the insensibility is reparative, natural, and evanescent; in the other cases it is the contrary.

E. And how is the manufacturing department connected?

R. A large telegraphic branch, the Pneumogastric, is sent down from the head office, and ramifies intimately with the ganglionic nerves over the heart, the stomach, and the lungs; but no message is ever forwarded from this region while all is going on well. If any hitch, however, should occur in any one department, a notice is forwarded immediately, so that it may be felt and considered.

You see, therefore, when I said that man was the type of all existences, mineral, vegetable, and animal, I said what was quite correct. Thus; he is a mineral in the slow chemical changes which are going on in the

removal and replacement of the bones; he is a vegetable as to his ganglionic system; and an animal in his reflex and sensorial.

E. I am glad to know how all these complicated actions are managed, for I have often wondered about them; and certainly if nervous force is not electricity, it is wonderfully like it.

R. I will tabulate, as I have done before, my conclusions on these forces and the different phases of Matter, in order to avoid any confusion, to impress them on your mind, and that you may corroborate them or not by your own studies.

1st. There is crude and unorganised Matter, acted upon by Motive Force, shall we say odylic (?), having as its rays or correlatives, Heat, Light, Electricity and its compounds, Galvanism, Magnetism (and their compounds), and chemical action.

2nd. There is organised Matter, a peculiarly subtile arrangement of inorganic particles (which is all we can really say of it), acted upon by identically the *same* Force, but modified and exalted by the subtilty of the arrangement, into what we now call Vital Force.

3rd. There is a still more subtile form of

organised Matter, where still the *same* force is exalted into Nervous—compounded of sensation and volition as in the Spinal column and sensorial ganglia.

4th. There is a most subtile arrangement (aided by large masses grouped together) in the nervous matter of the brain, where once more the force becomes *Ideal* or *Imaginative.*

Now all these forces are connected with, and, I believe, end with this world. They are all correlative rays of one and the same force, acting through different media, just as there are varieties of colours springing from one ray of light, or as one single particle of Matter may evolve that multitude of inorganic elements enumerated by the chemist.

So, again, Matter may be arranged in another form.

1st. Life in a mineral, we may say, is Motive Force, unaccompanied by sensibility.

2nd. Life in a vegetable comprises absorption, elimination, and digestion, with distinct respiration and circulation ; but with an obscure and rudimentary sensibility.

3rd. An animal possesses instinct and immature reason (modified and exalted in certain cases) excited by, and dependant

upon, the momentary circumstances in which it is placed, aided to a certain extent by experience, but *never estimating the consequences* of its acts.

4th. A man has not only this, but he has reflection and imagination also; thinking and reasoning more of the consequences of obeying the impulses which the surrounding circumstances excite, than of the impulses themselves; while, of course, he has that soul or spirit principle (and its emanation, conscience) which bridges over his present into his future life.

Now then, I shall be glad to discuss the point you wished to recall.

E. I can quite understand the qualification you make as to the progression in the brain formation in past life, and that a dog, say, with cerebral lobes may be, and is, capable of a certain amount of reason, and I think we may say even of rudimentary language. Thus two dogs meet, and one imparts a message or order to the other; this it not only executes, but actually seems to mature its plan of action as it goes along. Natural history is crowded with such cases. But how do you account for the same proceedings in insects, which have only very

small apologies for cerebra? Thus two ants meet, their antennæ touch in a certain peculiar way and something has passed between them. One is seen to go to a crowd of labouring ants, communicate in the same manner with some who communicate with others, and the whole mass leave their work to undertake some different work in altogether a different part, and of altogether a different kind.

R. You must not forget that the range of external circumstances is, after all, with these little creatures very limited; but I will not shirk the question; indeed I am very thankful you have mentioned it, for a special reason which you shall see soon. Now you must confess that such an amount of intelligence, as is manifested in the whole tribe of insects, must manifest itself through some organised medium; and, therefore, that in them *the nervous tissue and the nervous force, may be highly concentrated and exalted.* What do we know about the chemical constitution of their nervous systems? We have seen of what importance phosphorus is to ideal force, and of how little importance most of the other brain elements seem to be (page 43). How do we know that in their case this

essential constituent is not much increased? We have seen that the brain contains 72 per cent of water; let enquirers determine the effect of replacing the odd 2 parts of water with 2 parts of phosphorus!

E. Your idea sounds plausible, I grant; but I cannot think, do you know, that this explanation fully meets the case. Remembering as I do, from my own reading and investigations, the thousands of curious instances of marked reasoning which insects have shown under circumstances which no theory, as to instinct, can account for, there must, I think, be something more than this. I will take one which I myself can authenticate, though it is nothing so very extraordinary. One day a hungry spider felt a tug at his web. Out he ran, without pausing an instant, and rushing blindly on his prey, had one of his legs snapped off for his pains by the mandibles of a wasp which happened to have blundered in. The next day came another tug, and out bounded the spider, still more hungry than before; when suddenly, in the middle of his course, apparently bethinking himself of yesterday's escapade, he stopped, lifted up his mutilated stump—as much as if he would say, "Don't let me

make such a fool of myself as I did before, however hungry I am,"—proceeded cautiously, step by step, wheeling round and round nearer and nearer to his prize, until at last, seeming convinced that he might venture, he seized it, and dragged it into his den. Now what, pray, do you make of that?

R. Without estimating it as any very extraordinary example of insect reasoning—for I think I could easily match it by examples which have come under my own notice—and without for a moment withdrawing or qualifying my explanation of it, I should much rather like to hear what you make of it?

E. I can only say that such a creature has, by some means, become possessed of an intelligence utterly disproportioned to its size or importance in the scale of creation.

R. Am I to understand that this is the conclusion at which you have arrived?

E. I can see no other way out of it.

R. Let us analyse what occurred in your anecdote fairly and logically before we go further.

1st. The little insect experienced *sensation* and *perception* in the tugging at the web.

2nd. *Volition* was roused (being the action of the Will) in going to ascertain the cause.

3rd. So far, we have had only instinct; but we now get beyond that, for the creature stops and *remembers;* that is, it exercises *memory*.

4th. It *reflects* or *considers* the *experience* it had gained from its *digested sensations* of yesterday.

5th. It brings *judgment* into play as to the best mode of proceeding next.

6th. It *reasons* from the examination of the nature of its prey, that it may capture it and bring it into its den to satisfy its hunger. Have I stated the case fairly?

E. I will not quarrel with the dissection.

R. But if you will not, don't you see that, perhaps unconsciously, you are yourself voluntarily upsetting the main argument of the Infidel, viz., the doctrine of law? You are making a special providence, and if you do that, as I have shown you on the second page, you break the whole developmental chain; because, logically, if the doctrine of law be *true*, such an instance of displacement could not exist; and if it could, it could only do so by an unjust preference to, and at the expense of some other individual or species; for you are destroying that very order which is essential to law. You have only to think

this out, and you will see that it must be so. Now I have purposely led you—a little discursively, perhaps, as such a conversation must be—through this extensive range of the phases of Matter, and have suggested an idea as to the production of ideas which really favours the Infidel—if we consider them as emanations of Matter—and yet you quietly condemn him, without hearing any further arguments.

E. Do you know after your explanation of the mode of action of the ganglionic nervous system, coming as it did upon all the others, I almost decided to give him up as a perfectly hopeless case. But I don't fully grasp your meaning, nevertheless.

R. I say the moment you concede this point, then the cloud lightens. We see that a God having all these things pre-arranged in His mind, as parts of one whole comprehensive scheme, may so order the special circumstances of the species—or even of the individual—not only to show His Will but His power; and may adapt the particular variations in one case to the well-being of the whole. While in the case of man, foreknowing all the contingencies of his life, He may arrange to answer those appeals

which He also fore-knows will be made; or may permit his doom to overwhelm him, for not obeying those commands which He also fore-knew he would resist.

E. That may be so, but are you not now jumping out of the frying-pan into the fire? How do you reconcile this fore-ordination, (for it is really fore-ordination) of God with the free-will of Man?

R. I feel compelled to point out to you two very important cautions in enquiring into science, as connected with revelation, or *vice versâ*. The first is that there are some things which you must leave, as incapable of solution in this finite state. Take your own origin, your sex, privileges, particular bias of disposition, or lot in life; or the first organic germ; or that combination of electric and chemical action which we call Life, whether in the simple cell, the different organs, or the compound of organs—animal life; the re-creations in Geology; the implantation of the soul-germ, and where its seat is; or the thousands of other mysteries by which you are surrounded. What, may I ask, do you really know about any of them? So it is also with the reconciliation of God's fore-ordination and Man's free-will. Of this we may rest

assured, that Man has a will, and that it is free—at all events in health—to follow the dictates of his conscience. This question is not a subject for this discussion, though we might resume it another time; but I may say this, that Christ himself, did not reply to His own question, as to why the Tower of Siloam fell upon those eighteen particular men, whom it destroyed, and who He tells us were no worse than others; He leaves it unanswered. We can only apply to all these limitations (work it whichever way we will), all these sudden stoppings to further enquiry, all these rigid fiats of "so far shalt thou go and no further," all these comings to dead walls, or ultimate facts, the comment of the Master on another occasion: "Even so, Father, for so it seemed good in Thy sight."

E. I accept this, as a first postulate; now for the second.

R. It is that as, to the Christian, Science and Revelation must be ever intimately connected, you must not be disheartened if you find that there are discrepancies, discordances, and even interpolations in the sacred writings; and that you are not to brand those who affirm this as sceptics and unbelievers. We do no good by defending what is hope-

lessly weak, and it is this wilful persistence in resisting truth, which aids unbelief. No one has a greater reverence for the Bible than I have, but it is well known that some parts do need revising and explaining, and we always gain and never lose by boldly and honestly seeking the truth. We must reconcile the Bible with scientific facts, until reconciliation is no longer possible—but then we must yield. The recent discovery of the Sinaitic manuscript in the Convent of St. Catherine, Mount Sinai, in 1859, by Tischendorf—and which is by far the most perfect of any we have—necessitates this. Here I wish to allude to three points in the Biblical account upon which this discussion trenches, and to show you a way out of their difficulties which is quite satisfactory to my own mind, and I hope will be to yours.

1st. The earth is far more likely to have been 600 millions of years in reaching its present state, than to have been created in 6 days of 24 hours each. (2). Human beings probably existed upon it for, shall we say (?) a hundred thousand years before the date of Adam. (3). The Noachian deluge did *not* cover the whole earth at the period stated, and as for so long a time was ima-

gined. But why should these affirmations invalidate the Biblical truth? Because, we may regard (1) the days spoken of in Genesis, as so many separations of eras or ages, on Hugh Miller's view; (2) that however long man had existed, yet that Adam was the full and perfect type of humanity created by God as the first covenant man; (3) that there was not only a deluge in Syria and Palestine, but that it was universal, so far as the typical race was concerned.

At present, however, we are unwise enough to imply that the security of the fortress is pledged on the fact of some unimportant outwork. Let us remember that the Bible was not given to teach us science, and that, as a rule, it speaks of scientific facts as they appeared to the eye of the observer. Thus, when it implies that the Sun goes round the Earth, it describes the fact as it appeared to the people addressed. There is one course with respect to Bible controversies, which, if we follow, will assure us the fullest security for all time. Why should we fight so hard, or trouble ourselves so much, for that which means so little? Why should we waste our strength on extrinsics

which are of no value? So long as the grand and glorious principles of the Gospel are untouched; so long as it remains as the only Revelation of God's dealings and purposes with men; so long as we can appeal to it as the only portraiture of the source, development, and ripening of the divine life and love in the human soul; we may exultingly defy all the attacks of our enemies, and may gladly comfort ourselves with the kernel—which our hearts tell us is true and unassailable—while we leave them to wrestle for the husk. Let Cæsar take what belongs to him; let us but faithfully preserve that which belongs to God, and all the blatant sceptics in the world may be laughed to scorn; for on this rock we are invincible. Let me now complete my dealings with the Infidel, by advancing a few more reasons against his crude theories, and giving him, I hope, his *coup-de-grâce.*

E. I have observed that all the arguments you have advanced so far, have been built up on a scientific basis. You are now going to advance some, I suppose, more directly appealing to the reason.

R. Yes; but I shall not trouble you with many. 1st. You will have observed that

his doctrine begs everything from beginning to end. He has not only to account for Matter itself, and for its being set in motion, but he has to endow it, time after time, with every law or property he needs; and when pressed as to how all these laws were obtained, all he can say is, that they are as much a part of Matter as Matter is of itself! He is ever needing a First Cause, which he is too blind to see, or too conceited to acknowledge. The fact is, the whole infidel or deistical argument is a tissue of the most impudent and dogmatic assumptions, made by a mass of mediocrities—one appealing to, and repeating the assertions of, the other. I am sure you could scarcely keep smiling if you waded through all the pantheistic writings, to see how one pigmy shelters himself and crows behind another pigmy, as if that made his argument any the stronger. With every new discovery in science, they have to shuffle and dodge for new standing ground, and they give us as a substitute for the Bible, a host of wild ravings, which have neither the warrant of intellect nor of truth. A second consideration is—the evidence of design throughout the whole creation; and I will instance, as a proof of

this—with your permission—one or two of the organs of your own body. We may leave the nervous system, about which you were specially interested, and upon which you seemed to lay such stress as a weapon against the Infidel, and take any one single joint, or the heart; and if I say *they* are most wonderful machines, what is to be said of such organs as the eye and the ear? I prefer to take them, however, because their construction is simpler, and they have analogies in other machines by which comparison can be made.

E. Go on. You will make me an easy convert after what I have already learnt.

R. 1st.—Every joint in the body is covered with a most delicate membrane, not the thickness of the finest silk paper, and likely, you would suppose, to be utterly damaged or destroyed by the slightest blow or shock; yet we walk, leap, run, and go through the most violent exercises, for 70 years, and still each one of the hundreds of joints in the body remains intact and uninjured in the slightest degree.

2nd.—As to the heart. This organ contracts or pulsates 70 times in a minute for 70, 80, or 90 years long. Let us keep to

the first number. 70 pulsations a minute are 100,000 a day, 37 millions a year, and 2600 millions in the life-time of 70 years. At each contraction, or pulsation, or squeezing, 4 oz. of blood are forced through it; or 9½ cwt. every hour, 11½ tons a day, 4000 tons a year, and 280,000 tons in such a life. In space, this quantity would represent a column of blood a yard square—how high shall we say? As high as St. Paul's Cathedral, 460 feet? Yes, 2600 times as high, or 225 miles, or 65 millions of gallons, or a stream of blood 30 feet wide, 3 feet deep, and 22 miles long! Not only so, but it is all forced, in the first instance, up hill. Now if in the expanding of the heart preparatory to the next contraction, the blood once fell back into its chambers, death would instantaneously result; and to prevent this, there are small semi-lunar, parchment valves, which allow the blood to pass, but which then immediately close the tube with a sharp "click," which you may hear, until the next pulsation or contraction drives the blood onwards. At the end of 70 years of such uninterrupted labour this machine is generally found as perfect as in its infancy. It has throbbed, under all the constantly vary-

ing emotions which excite it, 2600 millions of times, and has lifted and impelled onwards 280,000 tons of blood, without making that one false stroke which would have ended life as by a thunderbolt. I am sure you will pardon my saying to myself, when I think of this awful—this stupendous fact: "Truly as the Lord liveth, and as thy soul liveth, there is but one step between thee and death." And I am sure you will now still more appreciate the marvellous providential wisdom, which took the control of such an admirable organ, by means of a separate and independent nervous system, out of the power of its so often reckless and foolish owner.

E. I am completely overcome with the evidences of such unutterable wisdom.

R. Well now—and I know I am going to use an old argument, but it must be introduced—suppose that in one of your walks you found a common watch, and you must confess there are many more intricate machines than that. You examine all its complications, its adaptations, its minute wheels, its exquisite compensatory balances, and the delicate coiled spring which originated the motion; but would you say for a moment

that it had arisen by chance? Would you say that the whole had been formed and grown by a fortuitous and accidental arrangement of molecules? Or would you not rather say that such a wonderful piece of mechanism, working, as you could see it did, by regular and well-defined laws, must have had a *Law-giver?* and that, as there was every evidence of careful and accurate design, so there must have been as inevitably a *Designer*, in whose *mind* all the different parts were pre-conceived and pre-ordered? Honestly, would it ever cross your mind that these laws and this design were inherent to the machine, and that it was self-produced? Just so with regard to the heart and to every other marvel of "God in Matter," which we have been investigating.

E. And is there not, pray, one single word to be said in defence of the Bible?

R. Certainly; but, as I told you, the Bible cannot be used in these arguments as evidence, and it would take a volume to defend it. As you have alluded to it, I may say, there are two points with respect to it, which seem to me to be unanswerable.

1st. There are the miracles of Christ and His resurrection.

2nd. If it be true that the Gospel so speaks to the heart and soul as to change its likings and dislikings, its whole bias and nature, then I say these two facts have an overpowering importance, and are quite sufficient proofs of its being a divine and not a human revelation. I myself cannot resist the evidence that the Bible, as to divine things, must be infallible; for this change in a man's heart—*the greatest miracle of all*—has not only been seen, but inwardly experienced by millions of the best, the noblest, and the wisest men on the face of the earth; and certified by such witnesses, why need we question any of the others?

E. And, may I ask, if the hosts of martyrs, who by their tortures have in all ages attested its truth, go for nothing?

R. I am afraid for next to nothing. Christianity is not the only principle which has enabled men to defy torture. But there is one more external proof which people do not regard sufficiently, and which to my mind, is a most trenchant one.

E. What is it?

R. It is the fact—and pray note it particularly—that 2,000 years ago, when the powers of the human intellect in Greece and Rome

were supreme; when Mathematics, Poetry, Philosophy, Eloquence, Sculpture, Painting, Architecture, and Engineering, were at their height—at their supremest acme of grandeur, these nations—with all their wonderful genius—could only devise such contemptible deities as Jupiter, Mars, Juno, Venus, &c.; that is, that with all their wisdom, in religion they were simply *Pagans*. Nay, their ideas of the very future itself, were obscure in the extreme, as you will find from their works. I have dispassionately examined many, and though odd men in a century seemed to have rather a clearer view, yet even Plato himself—one of the grandest souls undoubtedly who ever lived, and far as he was beyond his compeers—was looked upon in his works, when Christianity was spreading, as the main prop of heathenism.

E. But I should like, if you have no objection, to hear a little more concerning this very formidable argument.

R. Did not Paul even in his time—long after the great men I shall mention had passed away—find an altar at Athens, inscribed to the "Unknown God"? for no nation is so savage as not to believe in *some* God. Did not the Sadducees deny the im-

mortality of the soul, even although they had the whole of the older portion of the Bible? Cicero, arguing on the immortality of the soul, says; "Which of these things is true, God only knows, and which is most probable, is a very great question." Socrates says; "Death is one or other of two things—either to be deprived of all sensation, like a sleep unattended by dreams, or, if not, it is the soul's migration to some other place; but the Gods alone know which it is." This great, wise, and good man, came nearer, perhaps, in his system of morality to the Christian ideas than any other, and you see what *he* knew. Seneca, Epictetus, and Democritus teach, that you do not in death "go to a place of pain; you return to the source from whence you came, to a delightful reunion with your primitive elements. There is no Acharon, no Tartarus, no Cocytus, no Phlegethon." The Peripatetics adopted a modification of this. Aristotle says, and we can scarcely have a higher authority—"Death is the *most terrible* of all things (the true Christian, on the other hand, says it is the *most blessed*); it is the end of our existence, and after it man has neither *to expect good nor to fear evil.*" The fact is, we may sum all up in one of the

speeches of Socrates. "If, O Athenians!" he says, "I am in any respect wiser than others, it would be in this; that not possessing any knowledge of these things, I also confess I have not."

Then I have to ask you, What do you make of all this?

E. I can make nothing of it but one thing which seems to me incontestable—that both the Atheist and Deist are put in a terrible dilemma; for when the first tells us that there is no God, and the second tells us there is a God, but that He has given us no Revelation, unless they can give us proofs from their intellectual labours that they are greater than Plato, or Cicero, or Socrates, we may consider they can have no truer idea of a God or of immortality.

R. I am delighted to hear you take that view of it. Then there is lastly the direct and positive witness of Man's inner self. All this rant about Nature being our universal mother, and all these sentimental fancies, however they may satisfy the head, do not satisfy the heart. Every man, who reflects at all, yearns within himself for something more in accordance with his sympathies; and longs to commune with a Personal

Father, who he believes loves him, cares for him, and watches over him, rather than with some impersonal myth or some undefinable abstraction. It is only when the waves of affliction are passing over the soul, when his heart is disquieted within him, when desolation has come upon him like a whirlwind, and when his hopes are dried up like a potsherd—then it is, I say, that, as the hart panteth after the water-brooks, so pants his soul after a "living" God. I tell you it is when crushed into the dust, when he is standing in the presence of some mighty calamity, when the mask of stoicism and indifference will serve him no longer, that his true and inner nature must and will speak out: "Oh, my God, my *Father!* Why hast Thou forsaken me? Am I not Thy son, an offspring of Thy great Spirit? Why hidest Thou Thy face from my tears, and hearest not the voice of my crying, Oh my God?"

E. Are you intending to advance any more reasons? because I am quite satisfied.

R. No.

E. Then I want you now to clear up one more point, and this is the question of Intellectuality *versus* Spirituality. This evi-

dence from the ancients, has, I confess to you, staggered me completely. I never thought of it in that light before. Answer me then plainly. Can or can not the mind of man, unaided, work out the nature and character of God, His relations to Man, and those of Man to Him? It is, in my opinion, by far the greatest problem of all.

R. Avoiding your home-thrust if possible, one thing I may at least assure you of, that he who believes in Revelation has an infinite advantage over him who believes not.

E. Why so?

R. Because if it purifies and strengthens him in his daily walk, if it comforts him in sorrow, supports him in temptation, soothes him in pain, consoles him in affliction, takes away the sting from death, and enables him to look with hope to the future—even should it turn out *not* to be true, it has done him good instead of harm; whereas, if it *is* true, while he shall verily meet with his reward, the other shall as verily meet his merited doom.

E. That is certainly the wisest way to look at it; but I must still press my question, if you please.

R. Let me ask you also, then, one or two

in return. 1st. If the human mind alone could do it, why was it not done at the era I speak of, and is it any more probable that mere intellectual reasoning could do it now? 2nd. What could be the use of a Revelation if it were not purposely to reveal something which could not otherwise be discovered?

E. I have said the argument seems to me insuperable. But how is it that such assumptions ever get into men's heads?

R. That is simple enough. As you saw them begin their enquiries into the nature of Mind as if a complete development, ignoring its slow and gradual building up from infancy; so, having in a hundred ways (all unconsciously to themselves) got their ideas of a God from this Revelation, they utterly ignore the sources of their knowledge, and talk loudly of their ideas of Him being "cognate" and "innate," with a variety of other fine but empty expressions. It is simply a sheltering behind a rampart of words. That Man's Intellectuality will enable him to judge of this world as well as those about him, that he may examine with critical acumen the Bible as a composition, and that even despising it, he may reason

out that there is *a*, or *some*, unknown God, I readily grant. But I believe that *the spiritual is the sixth sense which no man can understand of himself.* You have urged this question upon me, and have thrust me to the verge of a great mystery. You insist upon an answer, and I can only give you the statement of that great philosopher, St. Paul (you know how much I think he was besides), that the things of the spirit *must be spiritually discerned*, and that the world, by mere wisdom, never did, and never will, know God. When we attempt—impudent upstarts that we are—to intrude ourselves by our intelligence (?) into the presence of the spiritual, a mighty grasp is laid upon each of us, and a fiat bursts forth: "What doest thou here without the countersign, O dust of Mortality? If the ancients knew not Me, shall I tolerate *thee?* Comparest thou thy paltry light to their blaze of glory? They had not the Revelation, nor the Spirit which revealed it. Leave thou, them to Me. *Thou* hast refused the talisman for which *they* pined. Stand thou back! The Spirit-sealed and witnessed only pass!"

E. I cannot wonder that you should lay great stress upon this point.

R. I do, the greatest stress. It is one main aim of my interview with you. I believe that we never shall make any real progress in spiritual training, until we realize fully, as a vital necessity, that just as there is the life of the body and of the mind, and just as they are built up and trained, so there is the life of the soul, to be also quickened, built up, and trained into its highest development—imperfectly here, perfectly hereafter. Our consciences tell us we have something more than Mind; and when the Soul acts, that it does so, or expresses itself, *through the mind,* who can doubt? But I believe no man ever did, or ever will, come to, or commune sincerely with God—to be able to say truly, "Abba Father," *by his mind alone.* In these soul-communions it is the spirit which breathes through, or impresses itself upon, or tunes the mind. And thus it is, that you will find men of the very highest intellectual calibre perfect heathens as to the divine life; while you will find others, intellectually heathens, very Newtons in the things of the spirit. How can this be except on the explanation I have given you?

E. It must be so; I cannot combat your reasoning; but will you now excuse my saying,

that I cannot but feel there is still *a* something wanting in your survey, comprehensive as it is, to complete the whole.

R. Can you point it out?

E. Pardon me if I give a short recapitulation of this discussion, as a final gathering in of all its various threads :—

I have seen Matter, beginning in one single atom—compound or simple—running on from its inorganic compounds through all the phases of organization into the highest form we know of — the agglomeration of nerve-vesicles and their communications in the human brain.

R. Well?

E. And I have seen that Force keeps pace with these different phases of Matter, running on from coarse Motive, through the more subtile forms of Vital and Nervous, into its supreme expansion, the Ideal.

R. Well?

E. And I have observed the sub-ray of this Force—Vital, running also backward from the highest being, Man, by an easy gradation into the animal; from the animal, over the cloudy line of demarcation into the vegetable; and from this, over the proportionately obscure boundary of organic, into

the remotest and minutest inorganic molecule.

R. Well?

E. And I have observed all these varieties of Matter and Force existing together as all joint links of one continuous chain.

R. Once more, I say, well?

E. And I have seen that man has, besides, a spiritual germ, to be quickened by God's grace into divine life, and which grows and ripens by spiritual food and exercise, just as body and mind do by theirs.

R. Well, and is it not enough?

E. No; there is something more. I have tabulated all into a series of Trinities in Unities to assist me, but I find there is still one Power short.

R. Show me your table.

E. In and over all is GOD,—The First Great Cause. Then,

1st. There are three forms of Matter: (1) Passive or Elementary; (2) Active or Developing, as in Creation; (3) Developed in our Era, as Nature.

2nd. Three Agents: Heat, Light, and Electricity.

3rd. Three Divisions, and three Lives: Mineral, Vegetable, and Animal.

4th. Three Forces: Motive, Vital, and Nervous.

5th. Three Ages: Inorganic (past), Organic (present), and Spiritual (future).

6th. Three Humanities: Body, Mind, and Soul or Spirit.

7th. Three Powers: Gravitation, Will, and——

R. And can you not detect that which is wanting?

E. No.

R. Let me relate to you then another trinity of incidents in my own life. And if I once more enter into these secret and sacred chambers, if I once more call up the memories of buried sorrows which have long slept, regard it as a proof of my desire to serve you, and as a fit closing of the discussion upon which we have entered.

E. I shrink from exacting this painful ordeal.

R. It must be paid or the subject would remain incomplete. Long, long years ago, I had a companion who was almost more to me than a brother. We walked, we read, we studied, we knew each other as intimately and as thoroughly as if we had shared the same nature, perhaps more so. There was a shade

came between us—no matter what—it was a secret which will die with us. We parted, but there was no change. Now tell me, I pray you, what *was* this bond which bound us—nay, which binds us still in heart together?

E. The bond of *Friendship.*

R. Just so. I will lift another curtain. You remember little Eveline. It seems but yesterday that I saw the light of her little life waning, day by day, like the fading of a dream—gently and imperceptibly as the lifting of a cloud. Her last sigh was on *my* cheek, her last kiss was on *my* lips, the last whisper of her undying love fell faintly on *my* ear, and her last smile, as her spirit seemed to linger near me for one brief instant longer—was for *me*, and for me alone, Tell me, I pray you, what was *this* bond which bound her soul to mine—nay, which binds it *still.*

E. The truest and sincerest *Affection.*

R. Again, just so. I must lift the curtain once more, but I do so with a throbbing heart and with a trembling hand.

E. Pardon me, I am slowly gathering up the link I missed. Is it necessary to open that terrible wound afresh?

R. No, no, trust me. I tremble, but I

have now no fear, a diviner love is mellowing the old. My sands are nearly run, the earthly house is fast dissolving, and I, the Self, the entity of this existence, shall soon, thank God, be merged into that immeasurable bliss, and in that glorious immortality, of which human happiness and human life are but the types. But, my dear friend, from that early time when I first saw her face, along all our chequered course, until that last sad sound of earth falling upon earth—that most melancholy knell which the heart of man can ever know—she had been my joy, my hope, my all! All that poets had sung or painters limned of Woman, she had been to me. To me, she was the embodiment of all beauty, as of all grace. Her voice thrilled me as by the sweet chords of a rich instrument; and when she died, the very light of life seemed quenched in gloom!

E. Enough, I know; it was a fearful *Love.*

R. It was. Let us drop the curtain. I have lived to learn its lesson—to *feel*, to *know* that we shall meet again. But see you not, in all these, a new and unsuspected Force? See you not that Friendship, Affection, and Love, though differing from each other, have one Eternal Source from whence

they spring? If you saw that Light resolves itself into the primary colours, red, blue, and yellow; so does the divine beam divide into these three primary rays acting through, and by the heart of Man. And as you have seen a Power added to Matter, in Gravitation, and as you have seen another Power added to Mind—Will; so there is also one more Power to complete the grand Trinity—that which, coming direct from God, speaks alike in the warmth of Friendship, in the Affection which gathers round our little ones, and in that Love which is stronger even than death, and in whose beams we bask as the flower in the Sun's rays.

Neither, mysterious and wonderful as it may seem, does it end here. See you not the same power moving at times all animal life? See you it not in the coquettings of those most beautiful of all God's creatures, the little birds which flutter in such restless agitation in our shrubberies? and see you it not also in what poets have called "The Loves of the Flowers"? Nay, what is Chemical action but Affinity, and what is this but the "Loves of the Molecules"? Ask the chemist what is the name of that influence which sways even the most minute and ulti-

mate atoms of inorganic Matter, and he will tell you it is the Power of which I speak. But more than this, uniting all Creation into one brotherhood, it is equally the life of each organic cell; it attracts—as by magnetic influence—kindred mind to mind; and, above all, it inter-penetrates the Soul, and draws it to its Fount.

And so, beginning with God as a Creator, I have endeavoured to lead you on, step by step, blending into this *one* focus all those other Forces, which, as subrays from, or messengers of, His Will, proceed direct from Him, ramify through all His works, and return to Him again. In the full light of its radiance I stand with you now—alike at the centre and periphery of both Force and Existence, and disclose to you the name of that third Power which is the keystone of all; which is limitless as is God himself; which bridges over even life and death; and which unites us not only in our secret communions with His Spirit here, but with Him, and with each other also, throughout all Eternity!

E. I foreshadow what you mean.

R. Yes; that centre and spring of all true love and all true unity, the undying Power of *Sympathy.*

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Tubbs & Brook, Printers, 11, Market Street, Manchester.