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Of Knowledge: Definitions: Time, Space, Matter, Force, Mind

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CHAPTER III

OF KNOWLEDGE: DEFINITIONS: TIME, SPACE, MATTER, FORCE, MIND

Scripture Lesson Reading *

Analysis

Building Stones of Knowledge:

- I. Duration-time; that in which things and events come to pass.
- II. Space; expanse; local and unlimited; that which holds things.
- III. Matter; eternity of; the stuff things are made of.
- IV. Force; an active element in things.
- V. Mind; intelligent, purposeful force--the master power of the universe.

References

Herbert Spencer's "First Principles"--chapter III.

John Stuart Mill's "Three Essays on Religion," especially the division of the essay on "Utility of Religion" (latter part): Also essay on "Theism", especially division on "Argument for a First Cause."

"The Outline of Science" by J. Arthur Thomson (4 Vols. 1922) Vol. I pp. 9-62.

"The Science History of the Universe" (10 Vols. 1909) Vol. 3 Physics, chapter I Analysis of Matter, ch. II Properties of Matter.*

John Fisk's "Cosmic Philosophy Vol. I chs. I to IV, and ch. VI. Also "Studies in Religion section on "Mystery of Evil."

* All the works given in the column of "References" should be read with discrimination; not accepting either all the premises laid down, or the conclusions reached. They are given merely as sources through which the student may pursue his thought-investigations, not for unquestioning acceptance.

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Of Knowledge: Definitions: Time, Space, Matter, Force, Mind

So far in treating of our knowledge it has been of earth-bound knowledge that we have spoken, limited to things we know of earth and earth life; and even within these limits it has narrowed to the indication merely of a very few things. Our proposed objective in this book, however, will require a broader view of man's knowledge. We must consider in outline at least what he knows of the solar system, of the things that exist beyond the earth and earth life.

Building stones of knowledge. To make this survey will require that we deal in a limited way with some definitions as to time, and space, and matter, and force, as necessary elements to our survey in outline of man's knowledge of the universe. Of course, I am proposing no deep, metaphysical inquiry into the nature of these building stones of knowledge, time, space, matter, and force. I shall not attempt any discussion of the "reality" of them at all; I shall only deal with such definitions and treatment of them as will make clear what may be presented as the general sum of man's partial knowledge of the solar and sidereal systems that make up the universe in which he lives.

Duration—Time. First then as to a workable definition of time. Time is said to be that part of duration in which events happen and in which events are distinguished with reference to concurrence of before and after; beginning and end; relation with reference to concurrence or succession. Also it is that within which change is effected and the express relation of change and continuity.

On the contents page for this chapter, Roberts remarked: "All the works given in the column of 'References' should be read with discrimination; not accepting either all the premises laid down, or the conclusions reached. They are given merely as sources through which the student may pursue his thought-investigations, not for unquestioning acceptance."

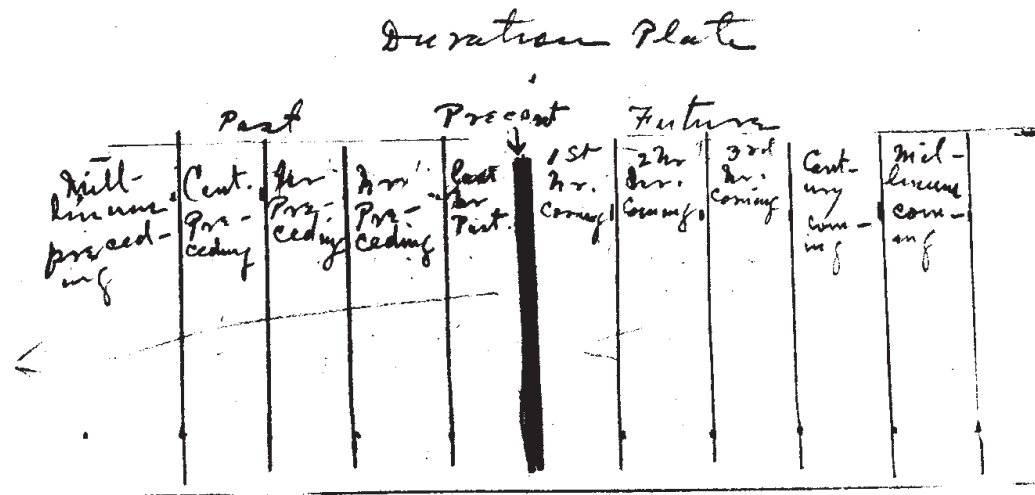
What is considered as absolute time—“time in itself”—is conceived as flowing at a constant rate, unaffected by the speed or slowness of the motion of material things. This flowing aspect of time—as indeed as to all its aspects—will be more clearly realized when it is considered with reference to its divisions of present, past and future; for time is conceived as so divided. The present really consists of but one moment, the “instant” that enters into past time ere one can name it *as forming the present*; even as it stands as the present moment, another moment from the future side of the present crowds it into past time, and this proceeds in constant succession. It is only by arbitrary arrangement that one may construct a present longer than this fleeting moment, and that is by stipulating your present as the present hour, or day, or month, or year, or century. Then the present holds as you have arbitrarily named it.

Time has another division that should be mentioned. It may be conceived as limited or unlimited. This division is usually expressed as time and eternity. “Time” in this use means a limited period of duration; and eternity means time without limitation—endless duration. To still more firmly grasp in consciousness this illusive thing called “time,” let us consider it both in this limited and unlimited phase: limited time is that part of duration which stands between two events, such as the time of the birth of the Christ, and the birth of George Washington; or the founding of Rome and the beginning of the New World Republic—the United States of America.

In considering limitless time—time without beginning or end—let us take this present moment or hour, or year, or century. First use the hour for our unit of measurement. Let us draw a perpendicular line, and let it stand for the present hour, then on the right side of this perpendicular line representing the present hour draw other lines, several of them, and let them represent hour-periods of future time. Then on the left of the line standing for the present hour, draw several other perpendicular lines to represent the past, and now: what was before this present hour? another hour; and what before that? another hour; and what before that? still another hour; and yet another, and another—on to infinity. Turn now to the other side of the present hour. What preceded this present hour into the past? The hour next beyond it in the past. And what preceded the second hour that went into the past? The third hour beyond it that went into the past, and the fourth hour, and the fifth that went beyond it into the past. And so on without limit. Starting in either direction from the present, into the past, or into hours yet to come from the future, you could never reach either beginning or end of them, they would stretch out to infinity. Time is without limits,

it extends to eternity. This will readily appear if instead of using the hour as the unit we use the same spaces marked off, calling them centuries or a million years, or periods that stand for ~~millions~~ or billions of years—you would get the same results. What preceded the present period of a million years? That period of a million years which is now gone to make up part of the limitless past. And what stands waiting to come in when the present period of a million years shall have passed? Just such another period stands waiting to take the place of the present such period. It is impossible to postulate to consciousness the contrary, viz. that duration, future, or past has limitations. This brings us to what in philosophy is held to be “a necessary truth.” “Necessary truths,” says Whewell,^a quoted with approval in *Webster’s International Dictionary*, under the definition of truth,

are those in which we not only learn that the proposition is true, but see that it must be true; in which the ⟨negative⟩ [negation] of the truth is not only false, but impossible; in which we cannot, even by an effort of imagination, or in a supposition, conceive the reverse of that which is asserted.¹



Duration plate showing the past, the present instant, and the future. Roberts breaks the past (“preceding” time) and future (“coming” time) into hours, centuries, and millenia.

^aWhewell, William W. (1794–1866) was known for his writings about diverse intellectual issues of the Victorian Period (physics, math, law, political economy, church architecture); he concentrated on the philosophy of science and attempted an extensive history of all “inductive sciences.”

¹*Webster’s New International Dictionary*, s.v. “truth.”

When the mind reaches that state of consciousness it rests as having arrived at a point beyond which it cannot go—it has reached a necessary truth.^b

Time, then, is that in which things happen, a ~~boundless ocean~~ **broad stream** of duration in which endless changes go on. It has no beginning! It can have no end; it will always be; it is eternity—**infinite after its kind**.

Space. Space is said to be that which is characterized by dimensions in boundless expanse and of indefinite divisibility; and also the boundless expanse itself. Space has to do with dimensions, position, and direction; continuous extension in all directions in which objects may exist and change their position. It is that in which matter or substances may be said to exist. Like its parallel existence, duration, it is without beginning or end—limitless. As in the case of duration, so with space, it can be demonstrated to be boundless. In this effort of illustration, we will not use the “moment,” but a “point” mathematically defined (and in that sense we here use it). A point is that which is conceived to have position merely, but no parts or dimensions. It is really the negative of extension. It is a position to which an imaginary line may lead, or a position from which imaginary lines may radiate in all directions.

We will suppose a point before us as a starting place from which extension shall begin through a series of enlarging circles, and our measuring unit shall be a thousand miles separating the lines. Having started from the line which circles our point, we come to the line next to it, and have past over a thousand miles of ~~space~~ **extension** to the next line; and what is beyond this second line? another thousand miles of space to the next line; and what beyond that third line? still another thousand miles of extension; and beyond that? still another thousand miles. Still other stretches of space of like distance, and so on to infinity, without being able to postulate a line or point beyond which there would not be further extension. We could never reach a point or a line beyond which there would be no “beyond.” And the mind is again forced to the conclusion of the existence of another necessary truth. The opposite **of this** limitless expanse can not be conceived. We may not postulate a point or line of which there is not a “beyond.”

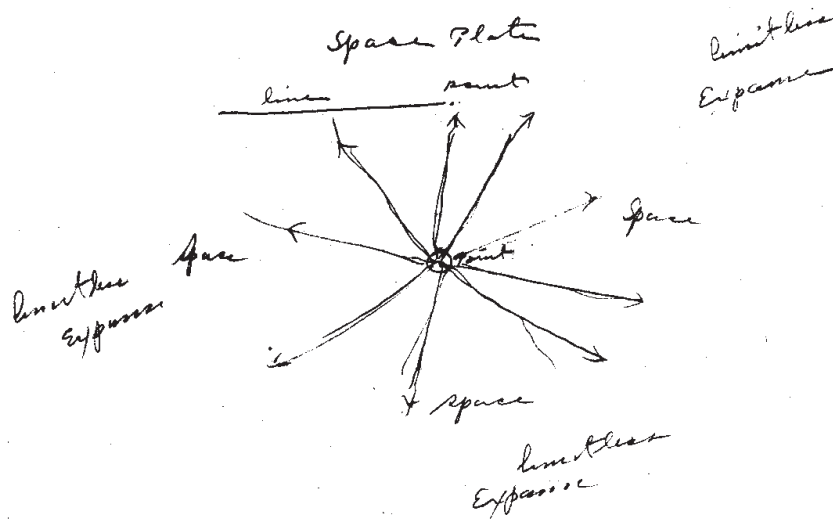
And now this by way of illustration: astronomers tell us that between our earth and the sun there are about 93,000,000 miles of space. What is beyond the sun in a straight line from us? space. 93,000,000 miles of it?

^bRoberts noted in the margin to the side of this paragraph a question mark and the word “footnote,” indicating the necessity of a footnote citation although none was inserted.

Yes, and if 93,000,000 miles be multiplied by 93,000,000 of miles the space in a direct line from us beyond the sun would not begin to be measured! At this point a mile seems so paltry a unit of measurement. Let us take a ray of light from the sun as our unit of measurement. Scientists tell us that in one tick of the pendulum of a clock a ray of light would pass eight times around the circumference of the earth, 186,000 miles! From Alpha Centauri, the brightest star in the constellation of Centaur, and the nearest to the earth, it would take a ray of light about three and a half years to reach us. It has also been estimated that it would take light over 16 years to reach us from Sirius, about 18 years to reach us from Vega, and over forty years to reach us from the Polar Star.²

So much space then lies between us and the Polar Star. What space lies in a direct line from us beyond the Polar Star? as much more space as that between our Earth and the Polar Star. And if the distance between us and some other star of the Universe were so distant as to require a billion years for a ray of light to reach us from it, the space in a direct line beyond would be just as great as between our earth and the supposed distant star—and so on, and on without limit!

Space then is boundless. It is without a center; it is without circumference! The contrary is inconceivable. We again arrive at a necessary truth. And space is infinite after its kind.^c



Space plate. Roberts shows how space extends limitlessly in all directions from any point.

²Gillett and Rolfe, *First Book in Astronomy*, 364–65.

^cFor current astronomy, see Carole Stotte, ed., *Images of the Universe* (New York: Cambridge University Press, 1991); National Research Council, *The Decade of Discovery in Astronomy and Astrophysics* (Washington, D.C.: Nation Academy Press, 1991).

Matter: Matter is usually defined as that of which any physical object is composed; material, “the stuff that things are made of.” In physics it is said to be that which occupies space, that which is conceived to constitute the body of the outward or physical universe; and, with energy, to form the basis of objective phenomena. The ultimate nature of matter is considered to be unknown, and the physicist can only describe certain of its properties and speculate as to its structure. The occupancy of space implies extension and impenetrability. The study of bodies under the action of forces has led to the conception of mass as a universal attribute of matter.

The general forms in which matter exists are solids, liquids, and gases. The chief thing that concerns us in the reference that we shall make to matter is its eternity and its limitless extension; its indestructibility and the necessary corollary of that quality, its uncreatability. Experiments have demonstrated the fact that the form of matter can be changed, but it can never be annihilated, equally certain is it that it can not be created in the sense that from nothing matter can be produced. On the point of the nature of “matter in itself” being unknown, Professor R. K. Duncan says,

What matter is, in itself and by itself, is quite hopeless of answer and concerns only metaphysicians. The *Ding an sich* is forever outside the province of science. If all men stopped to quarrel over the inner inwardness of things, progress, of course, would cease. Science is naïve; she takes things as they come, and rests content with some such practical definition as will serve to differentiate matter from all other forms of ⟨unknown matter⟩ [non-matter]. This may be done, strictly ⟨professionally⟩ [provisionally] in this place, by defining matter as that which occupies space and possesses weight. Using these two properties it is readily possible to sift out matter from all the heterogeneous phenomena that present themselves to the senses, and that, in this place, is what we want. Thus, wood, water, copper, oil and air are forms of matter for they evidently possess weight and fill space. But light, heat, electricity and magnetism we cannot consider to fill so many quarts or weigh so many pounds. They are, therefore, forms of non-matter ⟨light, heat, electricity, are properties of matter⟩. In like manner, things such as grace, mercy, justice, and truth, while they are existing entities as much as matter, are unquestionably non-matter.³

³Duncan, *New Knowledge*, 2. [In addition to the corrections made in the text above, a number of errors in spelling and punctuation have also been corrected.]

Grace, mercy, justice, and truth, are qualities or attributes of mind, or spirit, which may be matter, but of a finer quality than that which is cognized by the senses.⁴

As to what is called the “conservation of mass,” meaning by that the maintenance of the sum total of matter, the author of *The New Knowledge* says:

This law, known as the law of the conservation of mass, states that no particle of matter, however small, may be created or destroyed. All the king’s horses and all the king’s men cannot destroy a pin’s head. We may smash that pin’s head, dissolve it in acid, burn it in the electric furnace, employ, in a word, every annihilating agency, and yet that pin’s head persists in being. Again, it is as uncreatable as it is indestructible. In other words, we cannot create something out of nothing. The material must be furnished for every existent article. The sum of matter in the universe is x pounds,—and, while it may be carried through a myriad forms, when all is said and done, it is just— x pounds.⁵

⟨Chemistry⟩ has . . . disposed of the idea of the destruction and creation of matter. It accepts without hesitation the doctrine of the imperishability of substance; for, though the aspect of a thing may change through decomposition and recombinations, in which its constituent parts are concerned, every atom continues to exist, and may be recovered by suitable processes, though the entire thing may have seemingly disappeared.⁶

“The annihilation of Matter,” says Herbert Spencer,^d “is unthinkable for the same reason that the creation of Matter is ⟨unreasonable⟩ [unthinkable].”⁷

This indestructibility of matter and its uncreatability—not an atom of it capable of being created from nothing; and each atom impossible of annihilation, together with its limitless extension through space and equally throughout duration, brings to us the generalization of scientific thought best expressed in Haeckel’s^e Law of Substance,[†] viz.:

⁴See fr Jos Sm.

⁵Duncan, *New Knowledge*, 3.

⁶Draper, *Intellectual Development of Europe* 2:375.

^dHerbert Spencer (1820–1903) was an English philosopher who zealously supported evolution. He worked toward a unification of all sciences, arguing that science, which researches the unknown, supersedes religion, which organizes and rationalizes it.

⁷Spencer, *First Principles*, 182.

^eErnst Heinrich Haeckel (1834–1919) was a German zoologist and philosopher, greatly influenced by the principles of Darwinism, who instituted the theory of organic evolution. He was also an adamant believer in monism, which substitutes scientific evidence for religious doctrine, denying the existence of God.

[†]“List of Points on Doctrine in Question by the Committee [of the Quorum of

The law of substance.

1. "Through all eternity the infinite universe has been, and is, subject to the law of substance."
2. "The *extent* of the universe is infinite and unbounded; it is empty in no part, but everywhere filled with substance."
3. "The *duration* of the world (i.e. universe) is equally infinite and unbounded; it has no beginning and no end: it is eternity."
4. "Substance is everywhere and always in uninterrupted movement and transformation: nowhere is there perfect repose and rigidity; yet the infinite quantity of matter and of eternally changing force remains constant."⁸

Force: Persistence of force ~~or energy~~. To this statement in respect of the uncreatability and indestructibility of matter there must be added its necessary corollary, the conservation of, or the persistence in undiminished entirety the sum of force or energy throughout the universe. Force, as it concerns physics, is recognized as an active element in things; ~~that which acts, in contra distinction to that which is acted upon;~~ that which is in all natural phenomena, and is continually passing from one portion of matter to another.

Force is manifested in various forms, as mechanical, electrical, thermal, chemical, ~~energies~~ and changes under suitable conditions from ~~any~~ one form into another. As matter may not be created nor destroyed, so with force. The conservation of force rests upon the fundamental proposition that the quantity of force in the universe is invariable, but though its quantity can never be increased or diminished, the forms under which it expresses itself may be transmuted into each other. And while this idea may not "be as universally accepted as the indestructibility of matter, yet so numerous and so cogent are the arguments adduced in its behalf that it stands in an imposing way as altogether true." "It was in India," says John W. Draper, author of the *Intellectual Development of Europe*, and of the *Conflict between Religion and Science*,

it was in India that men first recognized the fact that force is indestructible and eternal. This implies ideas more or less distinct of that which we now term its "correlation and conservation." Considerations

the Twelve],” noted: “The wisdom in referring to Haeckel’s theory, which is disputed by many scientists, is questioned.”

⁸Haeckel, *Riddle of the Universe*, 242; italics in original. [Roberts left a notation in Haeckel at this point: “making & unmaking of worlds.”]

connected with the stability of the universe give strength to this view, since it is clear that, were there either an increase or a diminution, the order of the world must cease. The definite and invariable amount of energy in the universe must therefore be accepted as a scientific fact. The changes we witness are in its distribution,⁹

not in its creation and annihilation. As stated in the law of substance given above, “the infinite quantity of matter and of eternally changing force remains constant.”

Twentieth-century advancement in physics. Since writing the above which pertains chiefly to the indestructibility of matter and the conservation of force, it has occurred to me that some of our more recent writers and students may take exception to the matter as here set forth—regarding the writers quoted as far behind the recent knowledge of those who have taken the field since such writers as I have referred to above passed on, say some quarter of a century ago. Some of our present day professors hold that the principle of the indestructibility of matter has proven to be “definitely invalid”; and it is now sometimes held that a definite portion of matter “has entirely disappeared as a distinct and separate entity . . . of any system, . . . *radiant energy taking its place.*”¹⁰ That is, matter changes into radiant energy, and vice-versa, the change of a small amount of matter giving enormous quantities of energy.¹¹

In other words the new knowledge is largely sustained by Einstein^f and Dr. Millikan,^g the latter in his book on *Evolution in Science and Religion*, the “Terry Lectures”—Lecture I, “The Evolution of Twentieth Century Physics.” The sum of the matter amounts to this: the atom is found to be not the ultimate unit of material elements, indestructible and impenetrable as ~~it has~~ hitherto held to have been; but on the contrary is a complex thing, made up of a number of electrons, containing particles of positive and negative electricity capable of manifesting immense energy. It is held that atoms once regarded as the ultimate factors of matter may now be broken up and changed into something else—viz., into *radiant* energy. Thus it is held that the

⁹Draper, *Conflict between Religion and Science*, 126-27.

¹⁰Millikan, *Evolution in Science and Religion*, 15-16; italics in original.

¹¹Millikan, *Evolution in Science and Religion*, 16.

^fAlbert Einstein (1879-1955) fashioned the theory of relativity and earned numerous awards for his famous work in photoelectric effect, statistical physics, and quantum theory.

^gRobert Andrews Millikan (1868-1953) earned the 1923 Nobel Prize in physics for developing a device to measure the charge of an electron.

indestructibility of matter is proven to be “definitely invalid.” But not so fast! Let it be noted that the definite amount of matter has not been annihilated, but merely changed to something else, namely into “energy”—“radiant energy”; a small amount of matter giving off enormous quantities of energy. Be it so. And note again that our twentieth century physicists (and we speak respectfully of them, of course) say that, “beginning in 1901 the mass of an electron was shown by direct experiment to grow measurably larger and larger as its speed is pushed closer and closer to the speed of light (186,000 miles per second).”¹² And elsewhere in the lecture, Dr. Millikan says that in accordance with Dr. Einstein’s equation on the matter, “is it not more than probable that the process is also going on somewhere in the opposite sense and that radiant energy is condensing back into mass, that new worlds are thus continually forming as old ones are disappearing?”¹³ Certainly; and that is the very truth one ought to say. But why say, as Dr. Millikan does say, that “matter may be annihilated,” only to follow it immediately with “radiant energy appearing in its place”?¹⁴ The whole truth is that matter has been changed to radiant energy, and radiant energy, by motion approaching the speed of light, has been brought back to mass; that is, to matter. Matter has not been dissolved into “nothing”—into “non-existence”; and “nothing” by motion has not been brought into “something.” There has been no break in the continuity; something has existed all the while, and the old truth on the conservation of matter and force has not in reality been changed, but emphasized. For what have we here but the cube of ice placed on the stove where for a moment it sputters in water and steam and gases, then disappears to be seen no more? But even household chemistry teaches one that the steam and gases that have disappeared might have been condensed to steam again, the steam condensed to water, the water frozen into ice, and the original cube of ice restored. It seems no more than this has been done to the atom of Dr. Millikan’s treatise. Matter has not been absolutely destroyed, nor has it been recreated absolutely from nothing. The continuity of existence has not been broken at any point. All that has happened is that a forward step has been taken towards that truth announced by that inspired Prophet of the New Dispensation when he said: “All spirit is matter, but it is more fine or pure, and can only be discerned by purer eyes; We cannot see it; but when our bodies are purified we shall see that it is all matter.” This in May 1843 (D&C 131:7-8).

¹²Millikan, *Evolution in Science and Religion*, 15-16.

¹³Millikan, *Evolution in Science and Religion*, 17.

¹⁴Millikan, *Evolution in Science and Religion*, 16.

Or further *the reader may be* enlightened by the loftier passage from the writings of Moses, as found in a passage from a fragment of his ancient writings also brought to light by Joseph Smith in June 1830, and published in the Pearl of Great Price, where he says:

Behold, there are many worlds that have passed away by the word of my power. And there are many that now stand, and innumerable are they unto man; but all things are numbered unto me, for they are mine and I know them. . . . And as one earth shall pass away, and the heavens thereof [even] so shall another come; and there is no end to my works, neither to my words. (Moses 1:35, 38)

This somewhat antedates Dr. Millikan's remark (1928) that Lord Kelvin (an astronomer of the 19th century—antiquated according to Dr. Millikan) *would be shocked* “if he should hear the modern astronomers talking about the stars radiating away their mass through the mere act of giving off light and heat! And yet this is now orthodox astronomy.”¹⁵ And again:

if they do so in accordance with the Einstein equation then is it not more than probable that the process is also going on somewhere in the opposite sense and that radiant energy is condensing back into mass, that new worlds are thus continually forming as old ones are disappearing?¹⁶

“These,” he adds, “are merely the current speculations of modern physics, based, however, upon the now fairly definite discovery that conservation of matter in its nineteenth century sense is invalid.”¹⁷

The Prophet's remarks through the book of Moses—we repeat—somewhat ante-date Dr. Millikan's and Dr. Einstein's notion concerning the making and unmaking of worlds, but we can scarcely see that here has been any serious *or real* disturbance of the “old” 19th century doctrine of the conservation of mass and of energy or force. We shall let that doctrine stand, therefore, as we have placed it in the text of preceding paragraphs. “The elements are eternal”—when you get to them.

Mind: Intelligent force. Mind is to be here spoken of only in its relations to matter and force. Its proper and fuller treatment in the general scheme of things will be found in chapter 9 of this division of our

¹⁵Millikan, *Evolution in Science and Religion*, 17.

¹⁶Millikan, *Evolution in Science and Religion*, 17.

¹⁷Millikan, *Evolution in Science and Religion*, 17-18.

general theme (part I). But mind deserves mention here in connection with force and matter, ~~and~~ because of its relationship to them as a factor in causation, and in the sustaining, and the directing of creation; the one thing which may provide the purposeful element in the universe, and constitute the eternal cause, if not of the universe, at least of the cosmos, the orderly status and procession of things.

We sometimes speak of “blind force.” This is when we regard it in its mechanical, electrical, thermal, or chemical manifestations; in gravitation as attracting and repelling power produced by masses of matter and relative distances. But there is a force operating in the universe that is not blind, and that is not mechanical, or chemical merely; and this force, or energy, is mind. It is intelligent, and manifests purpose, and gives evidence of possessing powers of causation, of origination. All these manifestations are seen in man, in mind as manifested in man. He can regard himself as the nearest approach to a *vera causa*—true cause—than is immediately met with elsewhere in human experience. Man has learned that he can originate many things. He can take a great variety of materials scattered about, gather them together, and from them build a house according to a plan which his mind originated, and he becomes the cause of the house. By his mind the purpose and plan was conceived, and his hands by assembling and using the material, according to plan, caused the house. His mind also from the large field of its knowledge and experience, can build sciences, found governments, formulate systems of philosophy—create many things; they proceed from his mind, hence product of mind operating as an intelligent force. Often this mind in man makes use of other kinds of force: mechanical forces, electrical forces, thermal forces, chemical forces, and uses matter, things we call material, at will. Man has learned to regard the succession of phenomenon as effects, and can largely attribute to each some cause. When he comes to that cause, however, he finds it to be the effect of an antecedent cause, and so on, back and back seemingly to infinity. But the mind cannot rest in an endless chain of cause-effects, he feels that somewhere there must either be a first cause, or an eternal one,¹⁸ in any event a real one. And when it is found will it not be of the nature of that power which in man wells up as mind, which its true power of origination, but of course transcending the human mind in majesty, and power, and glory; a universal mind, proceeding from all

¹⁸First or eternal cause is discussed in chapters [7-9], all to the point of “eternal cause” being the truth of the matter.

harmonized, divine intelligences; the very “spirit of God,” everywhere present and present with power—the eternal cause and sustaining power of the cosmos, whose glory is intelligence, the master power of the universe?

Further references recommended by Roberts for this lesson: Fiske, *Outlines of Cosmic Philosophy*, vol. 1, chs. 1-4 and 6, and *Studies in Religion* section on “Mystery of Evil”; Kaempffort, *The Science-History of the Universe*, vol. 3, chs. 1 and 2; Mill, *Three Essays on Religion*, esp. “Utility of Religion” (latter part), also “Theism,” esp. “Argument for a First Cause”; Thomson, *Outline of Science*, 1:9-62. For further discussion, see pages 601-4 and 636-38 below.